

CHAPTER 1: INTRODUCTION

Bicycling is a popular activity in Seattle. Every day, approximately 6,000 people in Seattle's workforce use a bicycle as their primary mode of transportation¹. Thousands more bicycle to school, to access transit, to visit friends, to go shopping, and to improve their health². The membership of the Cascade Bicycle Club provides clear evidence of the popularity of bicycling throughout the Puget Sound Region - the club's 6,500 members make it one of the largest regional bicycle clubs in the nation. In addition, Seattle is home to the Bicycle Alliance of Washington, one of the most effective statewide advocacy groups in the U.S.

Between 1992 and 2000, the total number of bicyclists entering and leaving Downtown Seattle during the morning peak period (6:30 a.m. to 9:00 a.m.) increased by 57%³.

The City of Seattle has been a national leader in the development of urban trail systems, improving bicycle access across key barriers (most notably bridges) and in improving bicycle access to transit. SDOT was one of the first city transportation departments in the country to establish a Bicycle Program, which has been going strong for over 35 years.

These successes have led to a great deal of support for bicycling among Seattle's residents and elected leaders. Seattle residents passed the "Bridging the Gap" initiative in November 2006 to provide \$365 million over 9 years for street repaving, seismic repairs for bridges, pedestrian and bicycle improvements, and transit projects. Of this funding, approximately \$3 million per year will be directly available for bicycle lanes, multi-use trails, and other safety improvements, beginning in 2007.

The Burke-Gilman Trail is one of the most popular trails in the U.S. Approximately 1,800 bicyclists use the trail on a typical weekday, and 2,200 bicyclists use the trail on a typical Saturday.⁴

However, there are many challenges to bicycling in Seattle. Although Seattle has made great progress by building a trail network that is a model for cities throughout the world, Seattle lacks a connected system of bicycle facilities. Bicyclists face barriers, such as freeways, roadway crossings, and topography in many parts of the City. Many people would choose to bicycle if they had a connected network of comfortable, safe bicycle facilities throughout the City.

Bicycling is an important part of Seattle's transportation system for many reasons:

- Bicycling is an affordable mode of transportation, requiring only a fraction of the cost that it takes to own and operate a motor vehicle. The American Automobile Association estimates that the average American spends nearly \$8,000 per year to own and operate an automobile, while bicyclists typically spend less than \$200 per year.⁵
- Bicycling instead of driving a car can help to improve the environment by reducing greenhouse gases that contribute to global warming, and reduce the amount of pollution in our air and water.

¹ U.S. Census 2000.

² Approximately 11 percent of bicycle trips are for the purposes of earning a living or going to school; 89 percent of bicycle trips are for other purposes. Source: US DOT, *National Household Travel Survey*, 2001.

³ City of Seattle downtown bicycle counts, 1992, 1995, and 2000.

⁴ Moritz, B. and Cascades Bicycle Club. Burke-Gilman/Sammamish River Trail Survey, 2005. Counts taken from 7 a.m. to 7 p.m.

⁵ As estimated by the League of American Bicyclists.

- As a vehicle, the bicycle is very efficient in its use of public space.
- Unsafe behaviors from both motorists and bicyclists increase the chances of injuries on roadways. Because bicyclists' needs have historically been underserved, the current transportation system does not function well for bicyclists and precipitates conflicts between motorists and bicyclists. In cities that have effectively accommodated bicyclists, these conflicts tend to dissipate. Bicycling provides an opportunity for routine physical activity - which is increasingly important given the sedentary lifestyles of many Seattle residents. Recent health studies have shown up to a 50% reduction in Type 2 diabetes among people who engage in moderate physical activity - such as bicycling to work - on a regular basis.⁶

This Plan envisions a comprehensive network of on-and off-street bicycle facilities that connects all parts of Seattle, providing residents and visitors with convenient access to transit stations, workplaces, parks, commercial areas and many other destinations throughout the City. Within the next three years, the Plan recommends the implementation of 133 miles of new bicycle facilities. Within the next ten years, the Plan will create a 450-mile network of bicycle facilities, ultimately putting nearly all of Seattle's residents within one-quarter mile of a bicycle facility. The Plan also recommends a wide variety of partnerships to develop and maintain bicycle facilities, further support bicycle safety education, and encourage more people to bicycle for utilitarian and recreation purposes.

Bicycling serves a wide variety of community goals that fall under the jurisdiction and missions of many city departments and projects. Bicycling supports:

- Public health
- Quality of life/livability
- Environmental health
- Transportation choice
- Accessibility
- Recreation

--City of Seattle Bicycle Advisory Board, 2002

This Plan comes at an important time in Seattle's history. On November 7th, 2006, Seattle voters passed a comprehensive transportation levy that will provide a significant source of funding for transportation maintenance and improvements over the next nine years. This funding will help to accelerate the implementation of this Plan, including the development of capital projects that support bicycle mobility.

Citizens have shown significant interest in this Plan and have provided considerable feedback during the planning process. Attendance at public meetings exceeded 750 people over the course of 3 public meetings held between August and December 2006. In addition, more than 1,600 City residents submitted comments during the six-month planning process. Input from these citizens, recommendations from other key planning efforts, and a thorough inventory and analysis of the City's existing transportation system, combine to form the basis of this Bicycle Master Plan.

Implementing this Plan over the next 10 years will provide:

- Bicycle facilities on 62 percent (295 miles) of Seattle's arterial streets
- A 230-mile system of signed bicycle routes, connecting all parts of Seattle
- 50 percent more (19 miles of new) multi-purpose trails
- Partnerships to improve bicyclist safety and increase bicycling throughout Seattle

⁶ Journal of the American Medical Association, October 1999, based on a study by the Harvard School of Public Health.

The level of investment that will be required in order to implement this Plan is relatively modest in comparison to other transportation facilities. The estimated cost to implement this Plan over 10 years is approximately \$240 million (based on 2007 dollars). The Plan cost includes approximately \$35.7 million for on-road bicycle facilities, \$7.0 million for roadway crossing improvements, \$63.7 million for multi-use trail facilities (includes the Burke-Gilman Trail missing link), \$80.6 million for major capital projects (e.g., pedestrian and bicycle bridges), \$46.5 million for bicycle facility maintenance, and \$5.9 million for other projects (e.g., bicycle parking, bicycle maps, bicycle education, etc.).

Plan Background

Seattle's network of bicycle facilities has developed over time. The City adopted its first Bicycle Master Plan in 1972. The oil shortages of 1973 and 1979 boosted interest in bicycling. Railroad downsizing starting in the 1970s provided an opportunity for the City to develop multi-purpose trails along abandoned railroad corridors. In the late 1970s through the 1990s, the City focused on securing rights-of-way and constructing this system of trails, which became extremely popular among residents and visitors to the City. Significant portions of the Burke-Gilman, Alki, I-90, and Duwamish Trails were constructed during this period. New trails offered opportunities for people to become more comfortable riding a bicycle for utilitarian and recreation trips, however it soon became clear that improvements would also be needed to the roadway system in order to connect bicyclists directly to their destinations. The City's first Bicycling Guide Map and the Spot Improvement Program were established during this period.

More recently, the City has focused more of its attention on developing an on-road network of bicycle facilities to complement the multi-purpose trail network. This Plan is a direct result of the need to improve bicycle access on Seattle's roadway system. Seattle currently has approximately 40 miles of multi-purpose trails, and 25 miles of on-road bicycle lanes. The City's current network of trails and bike lanes are complemented by a number of other facilities, including bicycle route signs, bicycle parking, and bicycle racks on buses. There are also several miles of other on-road bicycle facilities, including wide outside lanes, rush hour bikeways, bus/bike lanes, and paved shoulders (see Table 1: Existing Bicycle Facilities).

Table 1. Existing Bicycle Facilities

Facility Type	Miles ¹
Bicycle lanes/climbing lanes	25.5
Shared lane pavement markings	0.3
Bicycle boulevards	0.0
Other on-road bicycle facilities ²	2.2
Multi-use trails	39.4
Other off-road bicycle facilities ³	0.2
TOTAL NETWORK	67.6

¹For on-road bicycle facilities, total miles represent roadway centerline miles with bicycle facilities (e.g., bicycle lanes on both sides of the roadway are not counted separately).

²Other on-road bicycle facilities include wide outside lanes, edgelines, paved shoulders, and peak hour bus/bicycle only roadways. Key corridors for short-term study and corridors where an improvement is needed, but the facility is unknown are also counted in this category.

³Other off-road bicycle facilities include sidepaths, one-way bike-on-sidewalk pairs, and pedestrian/bicycle-only bridges.

Bicycle racks and lockers, a BikeStation®, and bicycle racks on buses are all part of the existing system of facilities that support bicycling. Some have been provided by the City or other public agencies, while others have been provided by private entities. Over 2,300 sidewalk bicycle racks

have been installed in business districts since September of 1993, and bicycle parking requirements are included in the Seattle Municipal Code (23.49.019). More detail about the existing bicycling conditions in Seattle is provided in Appendix A: Existing Conditions for Bicycling.

Plan Development

The Plan was developed by gathering and analyzing public input, meeting with the Bicycle Master Plan Citizens Advisory Board (CAB), coordinating with City staff, other local agencies, and reviewing previous plans for bicycle facilities. In addition, the planning process included extensive field analysis of Seattle's existing transportation network to determine locations where bicycle facilities can be integrated into the existing street network. Over 600 miles of roadways were analyzed, including all of Seattle's arterial roadways.

Public input during the planning process was a critical part of identifying bicycling needs throughout the City, and was gathered through several methods, including:

- Monthly meetings with a Citizens Advisory Board (CAB), which included representatives of the Seattle Bicycle Advisory Board, Cascade Bicycle Club, Bicycle Alliance of Washington, and neighborhood residents.
- Three public meetings (450 people attended a meeting at the University of Washington on August 29, 2006; 215 people attended a meeting in Ballard on December 5, 2006; 110 people attended a meeting in Columbia City on December 7, 2006)
- An online Bicycle Master Plan questionnaire (over 1,500 people provided responses between August and September 2006)
- Meetings with representatives of surrounding jurisdictions that was coordinated through the Puget Sound Regional Council (PSRC).
- Review by Seattle District Councils (December 2006 and January 2007)
- Additional comments submitted by citizens to SDOT (over 100 letters and e-mails during the planning process)
- Presentations, upon request, to the Freight Mobility Advisory Committee, Southeast Seattle Transportation Plan Core Community Team, North Seattle Industrial Association and Manufacturing Industrial Council.

The SDOT Bicycle and Pedestrian Program consulted with a variety of other SDOT divisions, City and transit agencies, and other groups throughout the planning process. Those meetings were also important for identifying the best strategies for integrating bicycle infrastructure improvements into City's overall multi-modal transportation network (see Appendix B: List of Public Meetings Held During the Planning Process).

Plan Updates

This Plan is a living document and updates will be necessary in the future to assess progress, take advantage of emerging opportunities and re-evaluate priorities as needed. As new sections of the bicycle facility network are developed and new technologies are adopted, bicycling mode share will likely increase and travel patterns will change. Priorities will shift and new opportunities will become apparent. These changes will be reflected in yearly updates to the list of short-term projects. Updates to the full Bicycle Master Plan will occur every five years, as a part of the Transportation Strategic Plan Update.

CHAPTER 2: GOALS, OBJECTIVES, AND POLICY FRAMEWORK

Goals and Objectives

The two primary goals of this Bicycle Master Plan are:

- **Goal 1. Increase use of bicycling in Seattle for all trip purposes. Triple the amount of bicycling in Seattle between 2007 and 2017⁷.**
- **Goal 2. Improve safety of bicyclists throughout Seattle. Reduce the rate of bicycle crashes by one third between 2007 and 2017⁸.**

These goals essentially encompass all activities of the City related to bicycling and provide the underpinning for all of the Plan recommendations. Many of the Bicycle Facility Network improvements within the Plan can be achieved easily by making improvements using the Complete Streets approach (e.g., incorporating bicycle facilities into roadway reconstruction projects, repaving projects, etc.). The Plan also targets substantial capital investments at key locations within the network that may require additional funding and public support. Both short-term and long-term projects are necessary to create the accessible, connected network of bicycle facilities that is critical for attracting additional bicyclists and making bicycle trips safer.

Seattle will develop a continuous, complete network of bicycle facilities to make it safer and easier for more people to bicycle throughout the City.

The City has identified four principal objectives for achieving the goals of the Plan. Chapters 3 through 6 describe the objectives in detail. Strategic performance measures are also tied to each principal objective to monitor progress in implementing each recommendation. Monitoring of performance measures will occur periodically - some will be measured on a yearly basis, and others will be measured over longer periods of time, depending on the availability of source data. More detail on performance measures is provided in Chapter 7.

- **Objective 1. Develop a safe, connected, and attractive network of bicycle facilities throughout the City.** One of the most important outcomes of this Plan is a detailed assessment of Seattle's transportation system, resulting in specific recommendations for new facilities throughout the City. This Plan identifies the location and initial design concept for a system that encompasses over 450 miles. This system extends to all parts of the City, and will be designed to meet the needs of all types of bicyclists. The system will include bicycle lanes and other facilities on arterial roadways, a citywide bicycle route system, and completion of the Urban Trails and Bikeways System. The Plan will also result in bicycle safety improvements at roadway crossings, and improvements to the maintenance of the bicycle network. For more information on this objective, see Chapter 3.

Two strategic performance measures have been established to measure progress towards this objective:

⁷Tripling the amount of bicycling is contingent upon the completion of 20 critical bicycle connections. The amount of bicycling is measured by counting bicyclists at a consistent sample of locations in the City.

⁸The rate of bicycle crashes is the number of bicycle crashes in a year divided by the number of bicyclists counted at the sample locations and by the annual change in motor vehicle traffic volumes throughout the City.

- Percentage of Bicycle Facility Network completed.
 - Percentage of bicycle-related spot maintenance requests addressed in two working days or less.
- **Objective 2. Provide supporting facilities to make bicycle transportation more convenient.** In order for bicycling to be a fully viable form of transportation in Seattle, other programs and facilities are needed to compliment the Bicycle Facility Network. This includes integrated bicycle and transit services, adequate bicycle parking at all destinations, showers at employment centers, convenient repair services, and coordination with a variety of other essential components of a multi-modal transportation system. Partnerships will be needed with area transit agencies and other service providers to accomplish these actions. For more information on this objective, see Chapter 4.

Three strategic performance measures have been established to measure progress towards this objective:

- Number of bicycle racks installed through the SDOT Bicycle Parking Program.
 - Percentage of estimated 2017 bicycle parking demand met by current bicycle racks and lockers at transit stations in Seattle (recommended for consideration by Sound Transit and KC/METRO).
 - Number of bicycles carried on KC/METRO and Sound Transit buses (recommended for consideration by KC/METRO and Sound Transit).
- **Objective 3. Identify partners to provide bicycle education, enforcement, and encouragement programs.** As the Bicycle Facility Network is built and more people are encouraged to ride, new programs will be needed to educate bicyclists and motorists about how to co-exist safely in the roadway environment. Partnerships will be needed between SDOT, the Seattle Police Department (SPD), the Bicycle Advisory Board, the Bicycle Alliance of Washington, and Cascade Bicycle Club in order to accomplish this objective. For more information on this objective, see Chapter 5.

Two strategic performance measures have been established to measure progress towards this objective:

- Number of Seattle Bicycling Guide Maps distributed
 - Number of Seattle residents participating in pedestrian or bicycle safety education programs or events (recommended for consideration by Seattle area bicycle advocacy organizations)
- **Objective 4. Secure funding and implement bicycle improvements.** In order to implement this Plan, it will be necessary to include bicycle accommodations in all future transportation projects, secure grant funding, train staff, integrate the recommendations of the Plan into City policies and regulations, and coordinate with other jurisdictions in the region. In addition, new roadway design treatments will be evaluated for their effectiveness, and performance measures will be monitored to measure progress over time. Finally, it will be important to reassess priorities and update this Plan in future years as new needs and opportunities are identified. For more information on this objective, see Chapter 6.

Three strategic performance measures have been established to measure progress towards this objective:

- Percentage of targeted SDOT staff who participate in training on bicycle planning, design, and engineering issues.
- Amount of grant funding applied for and obtained for bicycle programs.
- Number of Bicycle Spot Improvements completed.

Policy Framework

Bicycling is consistently supported in numerous City, regional, and state policies as not only an important element of Seattle's multimodal system, but of achieving sustainable growth and encouraging healthy communities:

- *Destination 2030* is the Puget Sound region's transportation vision that lays out policies and strategies for meeting its commitment to the state's Growth Management Act. The plan calls for creating a regionally integrated network of bicycle and pedestrian facilities linked to urban centers and transit facilities, and seeks to have non-motorized trips account for 20% of all trips within the region by 2030.

"Walking and bicycling can be practical alternatives to driving, especially for short trips. They can also contribute greatly to neighborhood quality and vitality, and help achieve City transportation, environmental, open space, and public health goals."

--Seattle Comprehensive Plan, January 2005

- *Seattle's Comprehensive Plan* is the guiding vision for the City and includes the establishment of the Urban Village Land Use Strategy and the Urban Trails System. The plan seeks to facilitate walking and bicycling as a viable transportation choice "in, around, and between urban centers and villages."
- *The SDOT Transportation Strategic Plan (TSP)* provides direction for the accelerated provision and maintenance of a comprehensive bicycle network through improved safety and access to urban villages, schools, and the Urban Trails System, as well as through bicycle education and promotion. A key goal of the TSP is the routine accommodation of bicycle facilities as a component of all SDOT reconstruction, channelization, resurfacing, and paving projects, as well as other capital investments that affect Seattle's right-of-way.

By increasing the convenience and safety of bicycling in the City, the Bicycle Master Plan will help achieve the following principles laid out in the TSP:

- Make the best use of the streets we have to move people, goods and services.
- Increase transportation choices.
- Make transit a real choice.
- Encourage walking and biking—they're the easy, healthy way to get around.
- Improve our environment.
- Connect to the region.
- Make the most of transportation investments.

- *Seattle's Climate Action Plan* is a commitment by the City to meet or exceed the Kyoto protocols for reducing greenhouse emissions. Among the top recommendations put forth by Mayor Nickels' Green Ribbon Commission is a significant expansion of Seattle's bicycle facilities, including a completed Urban Trails System and regulations or incentives for bicycle parking, lockers, and showers in new development.

"Since motor vehicle emissions are the single largest source of climate pollution in Seattle, the City must do even more to provide climate-friendly transportation choices such as public transit, biking and walking — and to encourage greater use of those alternatives."

--Seattle Climate Action Plan, September 2006

- *Complete Streets* is a policy adopted by the City of Seattle in September 2006 that codifies the routine accommodation of bicycles as a part of all roadway system improvements. The guiding principle of this policy is "To design, operate and maintain Seattle's streets to promote safe and convenient access and travel for all users; pedestrians, bicyclists, transit riders, and disabled users, as well as cars and trucks."

These policies and strategies have guided the development of the Bicycle Master Plan, and will play an important role in building support for its full implementation.

Seattle's Complete Streets Policy - Guiding Principle: "To design, operate and maintain Seattle's streets to promote safe and convenient access and travel for all users; pedestrians, bicyclists, transit riders, and disabled users, as well as cars and trucks."
--City of Seattle Complete Streets Policy, September 22, 2006, Resolution 30915.

Coordination with Other Modes

Bicycle mobility improvements are an important component of creating an efficient, safe multi-modal transportation system in Seattle. As part of the vision for a multi-modal transportation system, the Bicycle Master Plan recommendations have been compiled with consideration for the needs of pedestrian, transit, freight, and automobile modes. The type of bicycle facility provided in each roadway corridor depends on available space, the role of the roadway in the overall Bicycle Facility Network, and the designation of the roadway relative to other modes of travel in Seattle.


There are a number of corridors in the Bicycle Facility Network where bicyclists must share the roadway with transit vehicles. Buses and bicycles are able to co-exist on roadways when they give each other space when passing, and make predictable movements. Recommended bicycle facilities in transit corridors, such as bicycle lanes, climbing lanes, and shared lane pavement markings help indicate the roadway space that is needed for bicyclists and improve the predictability of their movements, resulting in positive effects on motor vehicle and transit operations. Special attention will be paid to the City's Urban Village Transit Network (UVTN) corridors where transit service must be fast, frequent and reliable. Minimum performance thresholds have been established for UVTN corridors to monitor transit speed and reliability and make adjustments as needed.

Most of the recommended bicycle facilities can be developed by painting new lines or markings in the roadway or narrowing existing travel lanes. These actions are likely to have minimal impacts on other modes. In several corridors, bicycle facilities will be provided by removing existing travel lanes, which may potentially impact transit service (depending on bus frequency, intersection and bus stop spacing, traffic volume, on-street parking, overall roadway width, etc.). Therefore, it will be particularly important to coordinate bicycle facility recommendations with transit service improvements as Seattle's Urban Village Transit Network is developed. Urban Village Transit Network roadways (including the proposed Streetcar Network) should be designed to meet or exceed performance thresholds for a reasonable level of speed and reliability for transit service while maintaining safe conditions for bicyclists. Appendix C: Key Locations for Coordinating Bicycle Facility Design with Future Rapid Transit Service includes a map showing these locations.

Development of the on-road bicycle facility recommendations tried to minimize bicycle facilities on major truck streets. The exceptions are critical links in the recommended citywide bicycle system (see Appendix D: Key Locations for Coordinating Bicycle Facility Design with Freight Transportation), and will undergo thorough traffic engineering review for compatible operation with trucks during the design process.

In order to give full consideration to the needs of other transportation modes, the Bicycle Master Plan process included meetings with other SDOT divisions as well as a wide variety of agencies and organizations representing these modes. The planning process also included a thorough review of numerous relevant City and regional planning documents, including the policies cited in the previous section and the documents listed below:

- Seattle Transit Plan (including the Urban Village Transit Network)
- Freight Mobility Strategic Action Plan
- Open Space 2100 Plan
- Puget Sound Regional Council Destination 2030 Plan

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- Seattle Right-of-Way Improvements Manual
 - Relevant sections of Title 11 of the Seattle Municipal Code (the Traffic Code)
 - Subarea and Corridor Plans (e.g., Center City Circulation Report, Southeast Transportation Study, South Lake Union Transportation Study, University Area Transportation Study, Northgate Coordinated Transportation Investment Plan)
 - Bicycle Facility Reviews and Maps (e.g., Seattle Bike Map, Left by the Side of the Road Puget Sound Regional Bicycle Network Study (PSRC and Cascade Bicycle Club), Seattle Bicycle Facilities Collaborative Report, Urban Trails Plan, PSRC Regional Bicycle and Pedestrian Implementation Strategy for the Central Puget Sound Region)

CHAPTER 3. BICYCLE FACILITY NETWORK

Objective #1: Develop a safe, connected, and attractive network of bicycle facilities throughout the City.

Providing a network of bicycle facilities throughout Seattle is fundamental to achieving the goals of this Plan. Additional bike lanes, roadway crossing improvements, multi-use trails, and other facilities are needed in some areas of the city in order for bicyclists to reach key destinations and encourage more Seattleites to bicycle.

Figure 1 provides a conceptual map of some of the most important existing and future corridors for bicycling in Seattle⁹. While some of these corridors have existing bicycle facilities, some are in need of physical improvements to ensure they adequately accommodate bicycle travel. The interconnected network of on- and off-road bicycle facilities recommended in this Plan will serve these critical corridors, as well as many other parts of the City.

Figure 1. Major Bicycle Destinations and Key Bicycle Corridors (see next page)

To achieve the goal of tripling the amount of bicycling in Seattle between 2007 and 2017, several key connections with high bicycling demand will need to be completed (see Figure 1: Major Bicycle Destinations and Key Bicycle Corridors). These key connections include:

Lower-Cost Projects

- Redesign the existing bicycle lanes on Dexter Avenue N
- Make wayfinding and spot intersection improvements on the West Seattle Low Level Bridge
- Install bicycle lanes on Delridge Avenue SW
- Create an Interurban bicycle boulevard to Green Lane and Burke-Gilman Trail
- Install bicycle lanes, shared lane pavement markings, and signs to improve the connections between Capitol Hill and the UW Campus
- Install shared lane pavement markings on 2nd Avenue and 4th Avenue to provide a north-south connection through Downtown Seattle (includes removing the existing bicycle lane on 2nd Avenue)
- Install bicycle lanes on Alaskan Way in Downtown Seattle (when Alaskan Way is reconstructed)
- Provide good bicycle connections to and adequate bicycle parking at all light rail and other major transit hubs
- Complete the Citywide Signed Bicycle Route System
- Install or upgrade traffic signals to improve bicycle crossings at all intersections identified for signal improvements in the Plan
- Provide bicycle access to and from the ferry when the Colman Dock Ferry Terminal is reconstructed

⁹Figure 1 is a conceptual map showing existing and future bicycle connections throughout Seattle. Major activity centers include hub urban villages, Sound Transit station areas, major parks, and major neighborhood commercial areas. Key connections represent bicycle transportation corridors between activity centers. Examples of these connections include a new bicycle facility on WA 520, a trail connection between the Chief Sealth Trail and Downtown, and the completed Ship Canal Trail. The colors of the lines in each corridor represent the quality of existing bicycle connections. Line thickness indicates levels of bicycle activity in major corridors. In general, a corridor is considered to have “good” bicycling conditions if it is served by an existing bicycle lane, trail, or low-volume non-arterial street for a majority of its length. “Fair” corridors have these types of facilities for a portion of their lengths but may also have several barriers to bicycle connectivity. “Poor” corridors have limited or no bicycle facilities and may have significant barriers to bicycle connectivity. “No bicycle facility” means that there is currently no bicycle accommodation in the corridor.

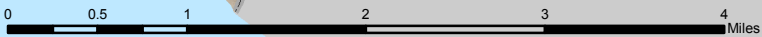
CONCEPTUAL MAP OF MAJOR BICYCLE DESTINATIONS AND KEY CONNECTIONS

SEATTLE BICYCLE MASTER PLAN
3/15/07

This is a conceptual map showing existing and future bicycle connections throughout Seattle. Major activity centers include hub urban villages, Sound Transit station areas, major parks, and major neighborhood commercial areas. Key connections represent bicycle transportation corridors between activity centers. These connections include a new bicycle facility on WA 520, a trail connection between the Chief Sealth Trail and Downtown, and the completed Ship Canal Trail. The colors of the lines in each corridor represent the quality of existing bicycle connections. Line thickness indicates levels of bicycle activity in major corridors.



Legend	
Estimated Quality of Existing Bicycle Connection	
	Good
	Fair
	Poor
	Does Not Exist
	Major Activity Center
	Road
	Seattle City Limit
	Park
	Urban Center, Urban Center Village, or Hub Urban Village
Level of Bicycle Activity	
	High
	Medium
	Low



Higher-Cost Projects

- Provide a bicycle facility connection between Downtown Seattle and the UW Campus via Eastlake Avenue N
- Complete the Ship Canal Trail
- Construct a Chief Sealth Trail Crossing of I-5 between S Spokane Street and S Lucile Street (and provide a trail on the east side of I-5 between the Chief Sealth Trail and the I-90 Trail)
- Construct the Burke-Gilman Trail section between 11th Avenue NW and 17th Avenue NW
- Construct a new bicycle and pedestrian bridge across I-5 between Wallingford and the University District
- Provide a bicycle facility connection between the I-90 Trail and Downtown Seattle
- Construct multi-purpose trail connections from the SR 520 Bridge to the UW Campus and to Downtown Seattle as a part of the bridge reconstruction project
- Either improve the bicycle lanes on Alaskan Way S/E Marginal Way S between S Spokane Street and Downtown or complete the E-3 Busway Trail between S Spokane Street and Downtown
- Either Rehabilitate the existing Ballard Bridge or add a new bicycle and pedestrian bridge adjacent to the Ballard Bridge

Further Evaluation of Bicycle Facility Recommendations

The projects that are recommended in this chapter will require additional evaluation during the implementation process to determine if there are other factors that may either help or hinder their development. Additional traffic analysis will be needed in some cases to determine the optimum design for specific locations. Like other public projects, neighborhood involvement will also be an important part of the evaluation process. Some locations shown on the map may be determined, after more detailed analysis, to require different or more costly improvements and therefore may become longer-term projects.

“The most useful thing that the City can do to encourage bicycling in Seattle is to create and maintain a connected system of bicycle lanes and trails that get people where they need to go throughout the City.”—Seattle Resident

Bicycle Facility Network Definition

Implementation of this Plan will establish a 450-mile network of bikeways throughout the City of Seattle. This Bicycle Facility Network is composed of all of the locations throughout the City where specific improvements have either already been made or are proposed in the future to accommodate bicycles. Subsets of the complete Bicycle Facility Network include bicycle lanes and other facilities on arterial roadways, the Urban Trails and Bikeways System, and the Signed Bicycle Route System.

Almost all Bicycle Facility Network segments will have some type of visible cue (i.e. a bike lane, a bike route sign, a pavement marking, a trail, etc.) to indicate that special accommodations have been made for bicyclists. While the network will provide primary routes for bicycling, it is important to note that - by law - bicyclists are permitted to use *all* roadways in Seattle (except limited access freeways or where bicycles are otherwise prohibited). Therefore, the Bicycle Facility Network will serve as a core system of major routes that can be used to safely access all parts of the city and other parts of the transportation system.

Portions of the Bicycle Facility Network identified as “short-term” are recommended to be implemented in the next three years. Other segments of the network will require a longer period to implement due to their higher complexity (see Table 2: Miles of Facilities Recommended for Bicycle Facility Network). The completed Bicycle Facility Network will connect all parts of the city, and will provide a bicycle facility within one-quarter mile of 95% of all Seattle residents (see Figure 2: Bicycle Facility Network).

Descriptions of recommended bicycle facility types are provided in Appendix E: Bicycle Facility Descriptions. These facilities include:

Facilities for network segments:

- Bicycle lanes
- Climbing lanes
- Shared lane pavement markings
- Multi-purpose trails
- Bicycle boulevards
- Shared roadways
- Bridge facilities

Facilities for roadway crossings:

- Full traffic signals
- Pedestrian crosswalk signals (with appropriate elements to facilitate bicycle crossings)
- Curb extensions
- Median crossing islands
- Overpasses and underpasses
- Warning signs

The Recommended Bicycle Facility Network Map shows all facilities in the Bicycle Facility Network, in detail (North Seattle and South Seattle Bicycle Facility Network maps are enclosed—see separate documents).

Fold-Out Maps: Recommended Bicycle Facilities (North and South maps) (see next pages)

An important subset of the Bicycle Facility Network is a 230-mile system of signed bicycle routes. This system includes local routes that connect destinations such as urban villages, transit stations, major parks, and other destinations within the City of Seattle; and regional routes that connect Seattle with other communities in the Puget Sound Region.

Table 2. Miles of Facilities Recommended for Bicycle Facility Network

Facility Type	Miles of Bicycle Facilities ¹		
	Existing	Short-Term Recommended ²	Total Recommended ³
Bicycle lanes/climbing lanes	25.5	62.5	142.0
Shared lane pavement markings	0.3	54.0	106.8
Bicycle boulevards	0.0	7.6	18.0
Other on-road bicycle facilities ⁴	2.2	5.7	46.8
Signed local street connections ⁵	0.0	28.6	76.8
Multi-use trails	39.4	41.9	57.9
Other off-road bicycle facilities ⁶	0.2	1.0	2.6
TOTAL NETWORK	67.6	201.3	450.9
¹ For on-road bicycle facilities, total miles represent roadway centerline miles with bicycle facilities (e.g., bicycle lanes on both sides of the roadway are not counted separately).			
² Short-term bicycle facilities include existing and short-term projects scheduled for 2007-2009.			
³ Total recommended miles include the existing, previously planned, short-term categories, as well as other medium- and long-term recommendations in the 10-year timeframe.			
⁴ Other on-road bicycle facilities include wide outside lanes, edgelines, paved shoulders, and peak hour bus/bicycle only roadways. Key corridors for short-term study and corridors where an improvement is needed, but the facility is unknown are also counted in this category.			
⁵ Signed local street connections include shared roadways with bicycle route signs but no other designated bicycle facilities. The recommended Signed Bicycle Route System is approximately 233 miles, including 50 miles of bike lanes/climbing lanes, 32 miles of shared lane pavement markings, 14 miles of bicycle boulevards, 6 miles of other on-road bicycle facilities, 47 miles of multi-use trails, 2 miles of other off-road facilities, and 83 miles of non-arterial streets without any other type of bicycle facility.			
⁶ Other off-road bicycle facilities include sidepaths, one-way bike-on-sidewalk pairs, and pedestrian/bicycle-only bridges.			

SEATTLE BICYCLE MASTER PLAN
4/3/07



RECOMMENDED BICYCLE FACILITIES (SOUTH)

SEATTLE BICYCLE MASTER PLAN
3/15/07

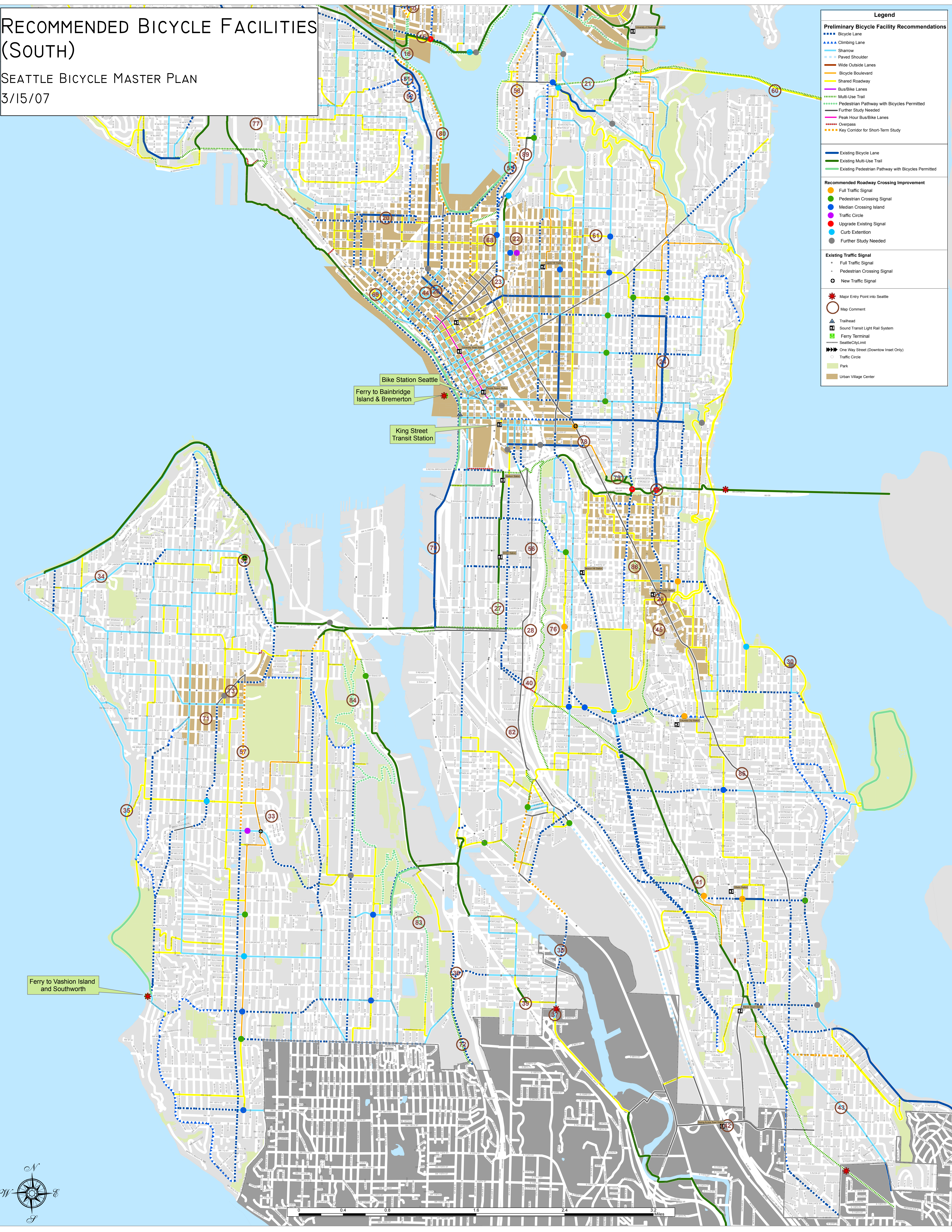


Figure 2. Bicycle Facility Network (see next page)

A Network to Meet the Needs of Different Types of Bicyclists

The proposed Network includes a variety of facility improvements that respond to the many different issues faced by bicyclists. Some parts of the Network will be located along independent corridors that are separated from roadways. Other parts of the network will require motorists and bicyclists to coexist in the same right-of-way. Even among “on-road” bikeways, there are a variety of different design treatments that will be used, depending on whether the roadway is a quiet neighborhood street versus a busy arterial street.

“I like to bicycle on arterial roads because they are most direct.” --Seattle resident

“I would love to bike to the store and to other errands, but the traffic, even here in West Seattle, scares me. Also I have two small children, and I really don't want to jeopardize them...I really like the idea of making bike boulevards on quiet residential streets.” --Seattle resident

“I generally ride 17 to 20 miles per hour, and appreciate on-street facilities that don't force me into being a pedestrian or make me stop all the time.” --Seattle resident

There are important reasons for providing a mix of bicycle facility types:

- Seattle is a built environment with a finite number of corridors that can accommodate multi-purpose trails. Consequently, bicyclists need access to the roadway system in order to create an interconnected system and be able to reach all desired destinations.
- Different types of bicycle facilities are appropriate in different situations, depending on surrounding land use characteristics, available right-of-way space, traffic volume, traffic speed and composition, on-street parking, roadway grade, etc.
- Depending upon an individual bicyclist's level of experience, some types of bikeways are preferred over others. For example, new bicyclists tend to prefer off-road multi-purpose trails and quiet neighborhood streets. More experienced bicyclists usually prefer on-road bicycle facilities such as bike lanes, wide curb lanes, paved shoulders, etc. Sometimes, more experienced bicyclists avoid using trails because they are crowded with other users.

For these reasons, the Bicycle Facility Network is composed of a variety of different facility types that can realistically be implemented, and will appeal to bicyclists with varying levels of experience.

Action 1.1: Provide bicycle facilities on designated arterial streets.

Seattle's arterial streets offer the most direct routes to workplaces, shopping areas, schools, transit hubs, and other destinations. They also tend to have gentle grades, compared to some notably steep non-arterial streets in the City. A lack of bicycle facilities on the City's arterial street system prevents more people from making trips by bicycle and makes conditions less comfortable for bicyclists who ride on them now. This action helps to fulfill Seattle's Complete Streets policy by ensuring that safe and comfortable bicycle travel is facilitated.

This Plan recommends bicycle lanes or climbing lanes on 142 miles of arterial roadways throughout Seattle. In addition to bike lanes or climbing lanes, the City will implement other types of on-road bikeways, including shared lane pavement markings, paved shoulders, shared bus-bike lanes, and other facilities. In total, designated bicycle facilities are recommended on 295 miles of arterial roadways in the City (see Figure 3: Designated Bicycle Facilities on Arterial Streets). Facility types are defined in Appendix D: Bicycle Facility Descriptions.

Figure 3. Designated Bicycle Facilities on Arterial Streets (see next page)

BICYCLE FACILITY NETWORK

SEATTLE BICYCLE MASTER PLAN
3/15/07

The recommended Bicycle Facility Network is a system that extends approximately 450 miles and encompasses all parts of Seattle. This system will be developed over the next 10 years, and will be designed to meet the needs of all types of bicyclists. It includes bicycle lanes and other facilities on arterial roadways, a 230-mile citywide bicycle route system that connects all Urban Villages, and the Urban Trails and Bikeways System. The system also includes bicycle safety improvements at roadway crossings.



Legend

- Network Intersection Improvement
- 1 Link Station
- ⚓ Ferry Terminal
- Roads
- Bicycle Facility Network
- Seattle City Limit
- Park
- Urban Village (Urban Center, Urban Center Village, or Hub Urban Village)

0 0.5 1 2 3 4 Miles

DESIGNATED BICYCLE FACILITIES ON ARTERIAL STREETS

SEATTLE BICYCLE MASTER PLAN
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Key components of the recommended Bicycle Facility Network are bicycle facilities on Seattle's arterial streets. Arterial streets often offer the most direct routes to workplaces, shopping areas, schools, transit hubs, and other destinations. They also tend to have gentle grades, compared to some notably steep non-arterial streets in the City. Arterial roadways will be redesigned to include bicycle lanes, climbing lanes, shared lane pavement markings, bus/bike lanes, and other facilities to help create a complete, connected bikeway system throughout Seattle.



Legend

Link Station

Ferry Terminal

Seattle City Limit

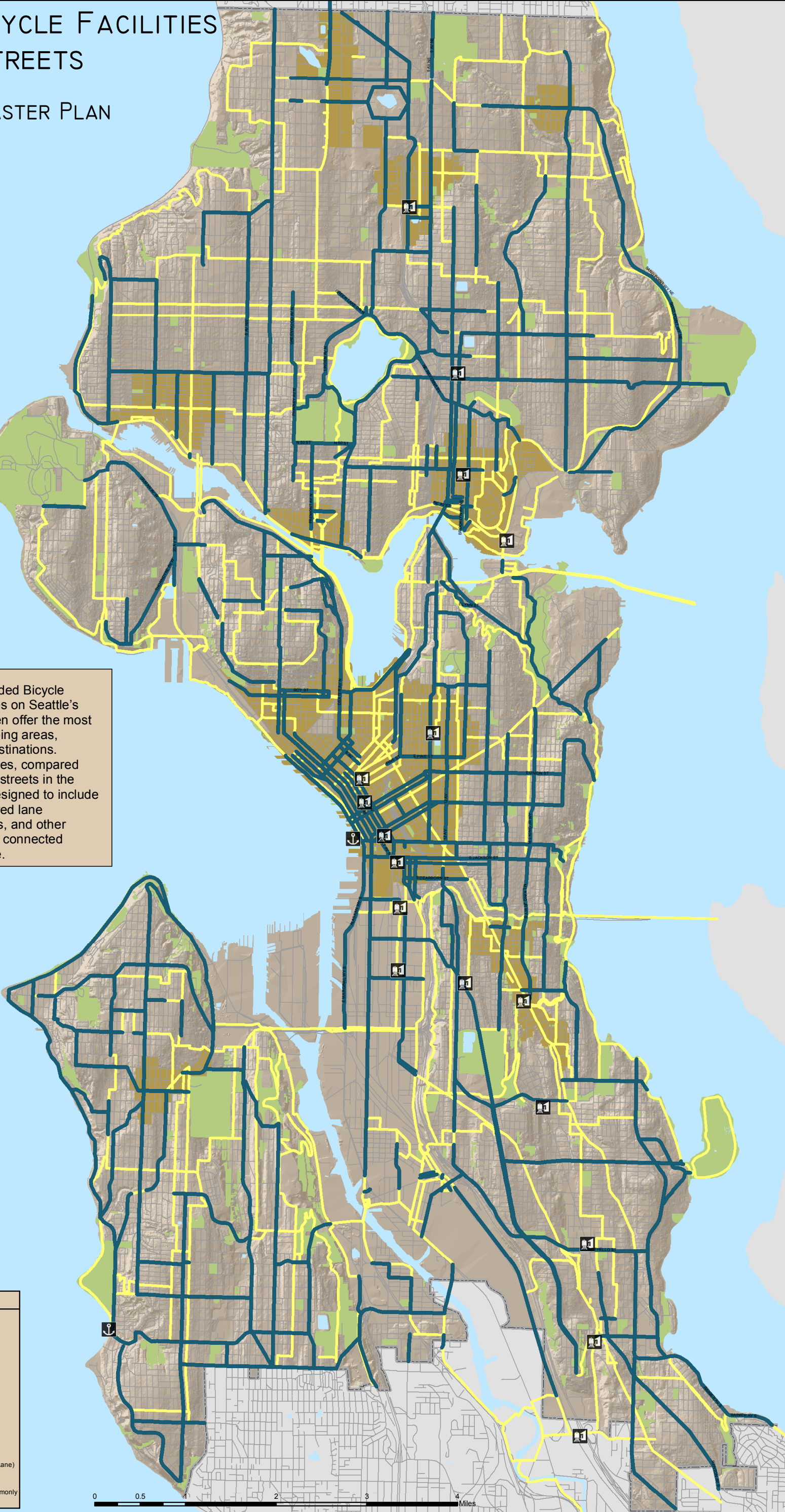
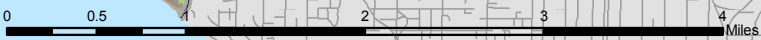
Road

Parks

Bicycle Facility Network

Arterial Street:
(Bicycle Lane, Climbing Lane, Sharrow, or Bus/Bike Lane)

Non Arterial Street:
(Trails, Signed Bicycle Routes, and other streets commonly used by bicycles)



As a part of the detailed analysis that was completed during this Plan, typical roadway cross-sections were developed that indicate the proper placement of bicycle facilities in a variety of roadway design configurations. Appendix F: Guidance for Retrofitting Seattle Streets to Create Dedicated Bicycle Facilities provides illustrations, photographs, and lists of considerations for incorporating bicycle facilities in common curb-to-curb roadway cross-sections in Seattle.

There are several roadways in the city where the existing bicycle lanes have less than the optimal width (e.g., sections of Dexter Avenue N, Martin Luther King Jr. Way, 12th Avenue E). These locations will be improved with the new types of treatments identified on the Recommended Bicycle Facilities Map and in Appendix F (e.g., narrow existing travel lanes to provide more space for bicycle lanes, utilize climbing lanes and shared lane pavement markings, post “Look for Bicycles” when opening doors signs near parking regulation signs, etc.).

Action 1.2: Complete the Urban Trails and Bikeways System.

The Urban Trails and Bikeways System was originally adopted as the “Urban Trails System” in the SDOT Transportation Strategic Plan (2005). This system provides a spine network of high-quality bicycle facilities, many of which are on separated rights-of-way from motorized traffic. A map of this system is included in the existing conditions report (see Figure A.6: Urban Trails and Bikeways System). SDOT should complete the Urban Trails and Bikeways System, as it includes a number of key components of the Bicycle Facility Network, such as completing the Burke Gilman Trail missing links, the Chief Sealth Trail, gaps in the Duwamish Trail system, the Interurban Trail bicycle boulevard, the Ship Canal Trail extension, the Mountains to Sound Greenway Trail between the I-90 Trail and Downtown Seattle, and the SR 520 Trail and its connections to Eastlake Avenue, Lakeview Avenue, Montlake Avenue, and Melrose Avenue.

This Plan recommends changing the name of this previously-adopted system from “Urban Trails System” to “Urban Trails and Bikeways System” to improve public understanding that the system utilizes some facilities other than multi-use trails, including sidewalks for pedestrians and bicycle boulevards and streets with bicycle lanes for bicyclists. This name change should be reflected in all future Seattle documents.

Action 1.3: Install a Signed Bicycle Route System.

The Bicycle Facility Network map identifies approximately 230 miles of signed bike routes that link all major destinations in Seattle. The signed route system will be a trunk route network connecting major destinations throughout the city. Appropriate sign design and placement will be critical to the success of the signage program. Signage for one to two routes will be tested in the short term after the Plan is adopted. Based on the results of this pilot program, the remainder of the network will be implemented. As new bicycle route signs are installed on each route, outdated signs will be removed.

The Signed Bicycle Route System will provide:

- Connections between Seattle’s Urban Villages
- Signs directing bicyclists to all new Sound Transit rail stations
- A signed bicycle route within ¼ mile of 72 percent of Seattle’s schools
- A signed bicycle route within ¼ mile of 88 percent of Seattle’s parks

This important subset of the Bicycle Facility Network includes local routes that connect key parks, transit stations, urban villages, schools¹⁰, and other destinations within the City of Seattle as well as regional routes that connect Seattle with other communities in the Puget Sound Region. These routes will indicate locations where bicycling conditions are favorable and which connect directly to major destinations throughout the City. Names of major activity centers (e.g., Urban Village

¹⁰ Signed connections from the trunk bicycle routes to schools will require detailed study, and are beyond the scope of this Plan. Many signed bicycle routes between the recommended trunk routes and schools as well as school walking routes will be identified through the Pedestrian Master Plan process.

Centers, other transportation hubs, and regional parks) will be the specific destinations listed on the bicycle route signs (see the major activity center names on Figure 1: Major Bicycle Destinations and Key Bicycle Corridors). The signed bicycle routes will also draw attention to bicycling as an efficient form of transportation (see Figure 4: Signed Bicycle Route System).

Signed bicycle routes utilize multi-use trails, bicycle boulevards, non-arterial roadways with low traffic volumes and speeds, and low-volume arterial roadways with bicycle lanes.

The system currently includes 18 miles of planned bicycle boulevards. Bicycle boulevards are non-arterial streets that are designed to allow bicyclists to travel at a consistent, comfortable speed along non-arterial roadways and to cross arterials conveniently and safely. Other non-arterial roadways in the signed bicycle route system could also be developed into bicycle boulevards in the future because they are already comfortable for a wide range of bicyclists. The following actions should be considered in order to develop a typical non-arterial street into a bicycle boulevard:

- Install pavement markings and signs to indicate that the roadway is a bicycle boulevard
- Provide safe and convenient arterial crossings using traffic signals or other geometric improvements
- Use traffic control or traffic calming to reduce conflicts with other non-arterial cross-streets
- Slow motor vehicle traffic on the bicycle boulevard using traffic calming treatments
- Limit the amount of motor vehicle traffic on the bicycle boulevard by managing traffic movements in the surrounding area

The complete signed route system will utilize many roadways and multi-purpose trails that are already excellent places to ride, but also includes several locations that will require improvements. Bicycle route corridors will not be signed until barriers to bicycle safety and accessibility are addressed. It will be particularly important to address safety concerns in locations where signed bike routes cross busy roadways.

“Make sure that the City of Seattle works closely with King County Parks and other regional jurisdictions on trail system connectivity and standard signage.” --Seattle resident

There will also be many feeder streets that connect between the trunk network and important local destinations, such as transit stations, schools, and commercial districts. Pavement markings may be used to supplement signs in some locations. Guidelines for the design and placement of signs and markings are provided in Appendix G: Bicycle Route Signage and Wayfinding Protocol.

Figure 4. Signed Bicycle Route System (see next page)

Action 1.4: Improve bicycle safety and access at arterial roadway crossings.

Improvements are needed at arterial roadway crossings in the Bicycle Facility Network to provide bicyclists with continuous, safe routes between destinations. Seattle has a number of streets that carry high-speed, high-volume traffic, such as 15th Avenue NW and Rainier Avenue S. Many other arterial streets are also challenging to cross, particularly during peak travel periods. In order to make it possible for bicyclists to travel throughout the City, there should be safe places to cross these major streets. Recommended improvements include treatments such as traffic signals, median crossing islands, curb extensions combined with signs, and/or markings (see crossing improvements on North Seattle and South Seattle Bicycle Facility Recommendations Maps—separate documents). These crossings must also be safe and accessible for pedestrians.

While the roadway crossing improvements map identifies many critical needs, it does not represent a complete inventory of the city’s intersections. The City should evaluate the Bicycle Facility Network for other potential bicycle crossing improvements. The first priority will be to improve intersections where existing bicycle facilities cross arterial roadways. Other key crossings should be considered as each new segment of the bicycle network is implemented. In addition, all future

RECOMMENDED SIGNED BICYCLE ROUTE SYSTEM

SEATTLE BICYCLE MASTER PLAN

3/15/07

1. Signed bicycle routes are intended to be used by a wide variety of bicyclists, including people who are new or less-experienced bicyclists. To optimize the quality of bicycling for people with less experience, bicycle routes are typically recommended on facilities such as multi-use trails, bicycle boulevards, lower-volume arterial streets with bicycle lanes, and non-arterial streets with low traffic volumes and speeds.
2. The Bicycle Route System designates main routes connecting urban villages in all parts of Seattle. While alternative connections may exist in many parts of the City, the official routes are designated at regular intervals to maximize access for residents in all neighborhoods.
3. The complete signed route system utilizes many roadways and multi-use trails that are already excellent places to ride, but also includes several locations that require bicycle facility improvements. Bicycle route corridors should not be signed until major barriers to bicycle accessibility are removed or a temporary detour route is identified. It is particularly important to provide convenient crossings when signed routes cross busy roadways.
4. Bicycle routes should include the distance to major destinations along the route. Destinations should be common neighborhood names (e.g., Ballard, Columbia City, Lake City, West Seattle Junction, etc.).

Chief Sealth Trail

←

36"

36"

36"

36"

36"

36"

36"

36"

36"

36"

36"

36"

Rainier Beach 0.9

Kubota Garden 1.3

New Holly Station 1.5

Ferry Terminal

Link Station

Seattle City Limit

Road

Regional Route

Pedestrian Pathway

Park

Urban Village Center

Proposed Signed Route

Minor Improvements may be Needed (e.g., Potholes, Drain Grates)

Some Improvements Needed (e.g., Bicycle Lanes or Sharrows)

Significant Improvements Needed (e.g., Trails, Structures, Major Traffic Revisions)

N

E

S

W

0

0.5

1

2

3

4

Miles

Sign Bicycle Route in Downhill Direction

Work with Shoreline to develop a northern east-west signed bicycle route

Alternative Routes Require Further Study

Alternative Routes: Use either proposed pedestrian/bicycle bridge or sidewalks on Ballard Bridge

Pilot Pedestrian Route Around Lake Union

Ferry to Bainbridge Island & Bremerton

KING STREET STATION

Alternative Routes Require Further Study

Ferry to Vashon Island & Southworth

Develop Signed Route to Airport. Options Include: 8th Ave SW, Des Moines Memorial Drive, etc.

Work with King County to connect with Green River Trail

Work with Tukwila to develop a southern east-west signed bicycle route.

roadway improvement projects should address bicycle crossing needs as a routine part of the design process. Specific design guidelines for bicycle crossing improvements are provided in Appendix H: Roadway Crossing Design for Bicycles.

Action 1.5: Improve complex corridors and focus areas in the Bicycle Facility Network.

Bicycle improvements are proposed in a number of complex corridors and focus areas (e.g., areas with right-of-way constraints, potential conflicts between multiple user groups, and multiple alternatives for providing bicycle facilities) throughout the city. In some cases, several alternative design treatments have been proposed to address the complex issues along these routes. The alternative that is ultimately chosen will depend on a variety of factors, including additional design development, cost, public input, trade-offs among other modes of transportation within the same corridor, or future development projects that provide new opportunities to improve bicycling conditions.

In other portions of the Network, one type of bicycle facility is proposed in the short term, but a different facility is proposed in the future when a roadway or bridge reconstruction project occurs or when bicycle demand increases.

For routes in the Network where complex issues are at play, circled numbers are included on the Bicycle Facilities Recommendations Map that correspond with a more detailed explanation in Appendix I: Bicycle Facility Recommendations for Key Corridors and Focus Areas.

Action 1.6: Make key operational improvements to complete connections in the Bicycle Facility Network.

There are many spot locations in the Bicycle Facility Network where bicycle access should be improved by making changes to roadway operations. The following is a list of general operational improvements that will be made by the City to complete bicycle connections.

- *Supplement “Dead End” and “Do Not Enter” signs, as appropriate, to indicate that bicycle and pedestrian access is allowed.* Add the words “Except Bicycles and Pedestrians” (or some other indication that bicycle and pedestrian access is permitted) to “Dead End” and “Do Not Enter” signs that only apply to motor vehicles. Many of these streets should only prohibit access to motor vehicles because they often lead to connector paths for bicyclists and pedestrians. Examples of locations for this improvement include:
 - 25th Avenue S & S Massachusetts Street
 - S Henderson Street at access to short Duwamish Trail segment at 10th Avenue S
 - 17th Avenue S, 18th Avenue S, and 19th Avenue S to I-90 Trail
 - 20th Avenue NE at Ravenna Park
 - 17th Avenue NW to connector trail between NW 88th Street and NW 90th Street
 - Melrose Avenue E & Melrose Connector Trail
- *Redesign traffic diverters to allow more convenient bicycle access.* The City should redesign traffic diverters to accommodate the pass-through of bicycles. This includes providing curb cuts of adequate width (meeting ADA and AASHTO guidelines). Example locations where diverters should be improved for bicycle access include:
 - 42nd Ave S & S Morgan St
 - E Republican Street & 17th Avenue E
 - Broadway E & E Edgar Street
- *Provide bicycle turn pockets at key intersections.* Left-turn pockets allow bicyclists to wait in a designated space for a gap in traffic before turning left. These pockets are particularly beneficial on roadways with relatively high traffic volumes and significant bicycle turning movements. Locations with raised medians provide good opportunities to add these pockets. A bicycle left-turn pocket is currently used at 8th Avenue and 77th Street in Northwest Seattle.
- *Improve bicycle access at pedestrian crossing signals.* The design of pedestrian crosswalk signals should be changed in order to improve their convenience for bicyclists. Many of the pedestrian crossing signals that have been installed to improve arterial roadway crossings

are difficult for bicyclists to use because they must dismount and become pedestrians in order to use the push button and receive the WALK signal. Further, crosswalks with pedestrian signal heads are provided only on one side of the local street at these crossings. Therefore, bicyclists crossing from one side of the roadway cannot use the signal without crossing to the opposite side of the street. In order to improve bicycle access, SDOT has established a policy to provide signals and crosswalks on both sides of non-arterial roadways at intersections with pedestrian crossing signals. The policy also restricts motorist movements at these intersections to left- and right-turns only to prevent cut-through traffic. Detection is needed for bicyclists in locations that can be accessed from the street (these should be *in addition to* accessible pedestrian push buttons that are provided for pedestrians). Currently, push-buttons for bicyclists are acceptable on non-arterial streets. As technological improvements increase the accuracy and feasibility of electronic bicycle detection methods (e.g., video, inductive loops, infrared, etc.), they will be preferred.

“Most often cross light activation buttons cannot be reached by a person on a bike. Buttons or electronic detection (in the case of arterial streets) should be placed in locations that are conducive to a safe and convenience crossing for all users.” --Seattle resident

- *Change the timing of traffic signals to accommodate bicyclists.* Traffic signal timing should consider all modes, including bicycling. Therefore, all traffic signals should facilitate safe bicycle crossings. This includes providing a minimum green time and a minimum yellow time to ensure that bicyclists are able to clear intersections, per the *AASHTO Guide for the Development of Bicycle Facilities* (1999 or latest edition). This is critical on the Signed Bicycle Route System. Signal timing changes must also be coordinated with transit on Urban Village Transit Network Roadways.
- *Explore new technologies to detect bicyclists at traffic signals.* In the future, explore new detection technologies such as infrared or video sensors that can tell the difference between bicycles and motor vehicles. This can help improve bicycle detection at actuated full traffic signals and make it possible to detect bicyclists at pedestrian crossing signals.

“Provide advance green for bike crossings, along with bike boxes at lane heads, especially in high-traffic, high-bike-density areas.” --Seattle resident

- *Explore innovative timing and designs for bicycles at traffic signals.* This includes modifying pedestrian crossing signals to have separate push-buttons or sensors to detect bicyclists, pedestrians, and motor vehicles. This allows the traffic signal to stop arterial traffic for a shorter amount of time for bicyclist crossings than for pedestrian crossings. Separate indicators are provided for bicycles versus pedestrians at these intersections. The City of Tucson, AZ has successfully used this signal design. Bicycle boxes should also be considered at signalized locations with high numbers of left-turning bicyclists (e.g., Roy Street at Queen Anne Avenue N).
- *Improve bicycle accommodations on bridges.* Bicycle accommodations on bridges needs to be improved, as well as on their approaches and access ramps. In the short term, bicycle access should be improved using signage, marking, maintenance, and other spot improvements. In the long term, bridges should be replaced with new facilities or retrofitted with facilities that provide full bicycle access (e.g., bicycle lanes or wide sidewalks - minimum 10 feet). Bridges are critical for providing bicycle connectivity throughout Seattle. Critical bridges for bicyclists include:
 - Ballard Bridge
 - 14th/16th Street Bridge
 - Montlake Bridge
 - Fremont Bridge

- Aurora Bridge
- West Seattle Low Level Bridge
- All bridges across I-5
- *Explore the possibility of using “Bicyclists Allowed Use of Full Lane” signs.* These signs should be considered in high-traffic areas, such as Downtown Seattle, to remind motor vehicle drivers of the legal right of bicyclists to use the roadway. Guidelines for use of these signs, including number of travel lanes, speed limits, and other roadway factors will need to be developed. The signs have been used in San Francisco.
- *Provide alternative bicycle accommodations during road or trail construction projects.* Detour routes for bicyclists should be provided as a part of all construction projects that affect bicycle access, regardless of whether or not the roadway is in the Bicycle Facility Network.

“Detours must be created with the safety of the cycling community as well as cars and trucks in mind.” --Seattle resident

- *Allow bicyclists to use elevators constructed for public use.* Bicyclists should be allowed to use elevators that are incorporated into buildings and other structures in areas with steep terrain. Opportunities for elevators are limited, but may be useful for improving access in a few parts of the Bicycle Facility Network. For example, bicyclists will be allowed to utilize the elevators that will serve the Beacon Hill light rail station to avoid major hills in the area.
- *Investigate potential improvements for bicycle access through the Seattle Pedestrian Master Plan.* SDOT will develop a Pedestrian Master Plan in 2007, and this Plan will examine several issues related to bicycle access. These issues include:
 - Pedestrian crossing signal design (e.g., improve access for both pedestrians and bicyclists)
 - Additional locations for pedestrian pathways with bicycles permitted (e.g., potential pathways through parks; improvements to stairs)
 - Designating some street sections for bicycle and pedestrian use only

Action 1.7: Provide wayfinding guidance through complicated connections in the Bicycle Facility Network.

Wayfinding signs and pavement markings should be provided to help bicyclists navigate through complicated sections of the Bicycle Facility Network (in addition to official Signed Bicycle Routes). There are a number of locations in the City where it is necessary to use non-arterial streets, alleys, or sidewalks to connect between existing or proposed bicycle facilities. While many of these connections are shown on the Seattle Bicycling Guide Map, there are no signs or markings along the actual connection. The City will install a combination of signs and markings to guide bicyclists through these connections. Examples include:

- The connection between the existing bicycle lanes on Delmar Drive E and the existing multi-purpose trail on the southwest side of the Montlake Bridge
- Connections to the I-90 Trail
- Connections to the Magnolia Bridge
- Connections from neighborhood streets in West Seattle to the Low Level Bridge Trail.
- Connections from northeast Seattle neighborhoods to the Burke-Gilman Trail.

Action 1.8: Improve the quality and quantity of bicycle facility maintenance.

Bicycle facility maintenance will be improved by establishing clear maintenance responsibilities and continuing to involve the public in identifying maintenance needs. Maintenance agreements between SDOT and other City agencies should be renegotiated to take advantage of the strengths of each agency. In addition, there are also opportunities to utilize volunteers to assist with some maintenance tasks. These actions will improve the efficiency and quality of bicycle maintenance in the City:

- *Renegotiate the 1987 maintenance agreement between SDOT and Seattle Department of Parks and Recreation (DPR).* The maintenance agreement should be updated to reflect the many new facilities that have been completed. The renegotiated agreement should continue to divide maintenance responsibilities along the same lines as in the past, i.e., DPR will be primarily responsible for trails that also serve as linear parks or greenways; SDOT will be primarily responsible for other trails. The SDOT Street Maintenance Division should be part of the team that renegotiates this agreement.
- *Negotiate a maintenance agreement between SDOT and Seattle City Light on maintenance of trails in utility corridors.* The maintenance agreement should build on the principles agreed to in previous agreements to construct trails in City Light rights-of-way. The SDOT Street Maintenance Division should be part of the team that negotiates this agreement.
- *Encourage bicycle organizations and other community groups to assist with minor maintenance activities.* The City will work with bicycle organizations, community groups, civic organizations, and businesses to provide periodic upkeep along trail corridors and bicycle facilities on bridges. This will help improve bicycle facility safety, reduce maintenance costs, and build goodwill with neighborhood residents.

“It is all well and good to create bike lanes and wide shoulders. If they are full of debris and unsafe, it’s worse than if they weren’t there...keep them clear.” --Seattle resident

- *Continue to respond to citizen complaints and maintenance requests.* The current Bike Spot Safety program accepts maintenance complaints and requests from citizens. It uses these requests to make short term improvements and to set maintenance priorities. SDOT should continue and expand this program to identify problems that need immediate attention, to identify recurring problems at particular locations and to set major maintenance priorities.
- *Consider different types of weather conditions when developing and maintaining bicycle facilities.* Weather and seasonal issues will be considered in the development and maintenance of bicycle facilities, within reasonable limits. For example, slip-resistance will be a factor considered in the selection of pavement markings for bicycle facilities and roadway and trail sweeping may be done more frequently in the fall when leaves can cover some facilities. Drainage will also be addressed in the design of all bicycle facilities.

If bicyclists notice glass or debris on a roadway, they should report it promptly to SDOT, either by calling the Street Maintenance Dispatcher at 206-386-1218 or by filling out a request online at <http://www.cityofseattle.net/transportation/potholereport.htm> so that SDOT can clean it up.

The tables below provide general guidance on the frequency of multi-purpose trail and on-road bicycle maintenance activities, though maintenance needs will vary for different types of facilities and different locations (see Table 3 and Table 4). SDOT, Seattle Public Utilities, and Seattle Parks and Recreation, are responsible for specific activities.

Table 3. Multi-Purpose Trail Maintenance Activities

Activity	Spot Maintenance	Routine Maintenance
Improve drainage	<ul style="list-style-type: none"> • Unplug individual drains (Seattle Public Utilities) • Repair trails after land slides 	<ul style="list-style-type: none"> • Clean all culverts, catch basins, and drainage structures on a regular schedule as needed (Seattle Public Utilities)
Trim vegetation	<ul style="list-style-type: none"> • Cut or remove vegetation that falls or grows onto trails (Seattle Public Utilities has certain responsibilities; other responsibilities will be established through agreement between SDOT and Department of Parks and Recreation) 	<ul style="list-style-type: none"> • Trim all vegetation within 3 feet of either side of all trails up to 10 feet above the ground; trim additional vegetation to improve sight distances near intersections (one time per year) (responsibility to be established through agreement between SDOT and Department of Parks and Recreation)
Replace pavement	<ul style="list-style-type: none"> • Fill potholes • Remove surface irregularities 	<ul style="list-style-type: none"> • Replace pavement (every 10 to 20 years, but will vary significantly depending on conditions) • This Plan needs to be updated based on a sidewalk management system that will be used to estimate budget needs for pavement rehabilitation (scheduled to be completed in 2009)
Replace signs	<ul style="list-style-type: none"> • Replace missing or damaged warning, regulatory, or wayfinding signs 	<ul style="list-style-type: none"> • Replace signs based on manufacturer recommendations related to reflectivity and readability (every 15 to 20 years)
Inspect structures	<ul style="list-style-type: none"> • Address structural problems 	<ul style="list-style-type: none"> • Include trail structures in the same inspections schedule as all other structures in the City; if structure is deteriorating, it should be added to the Citywide schedule for structure repair/replacement
Clean trash and debris	<ul style="list-style-type: none"> • Enlist the help of bicycle and pedestrian organizations, neighborhood groups, and other citizens to help clean broken glass and other sharp objects, loose gravel, leaves, and other debris 	
Provide adequate lighting	<ul style="list-style-type: none"> • Replace burned-out and broken lighting fixtures 	<ul style="list-style-type: none"> • Evaluate adequacy of lighting at intersections where trails cross City streets

Table 4. On-Road Bicycle Facility Maintenance Activities

Activity	Spot Maintenance	Routine Maintenance
Sweep bicycle lanes and other on-road bicycle facilities	<ul style="list-style-type: none"> • Perform spot sweeping if debris collects in bicycle lanes after major rain storm • Perform spot sweeping if sand is left in bicycle lanes after a snow/ice storm 	<ul style="list-style-type: none"> • Sweep bicycle lanes (two times per year) • If adjacent travel lanes are swept mechanically, make sure material is not deposited in the bicycle lanes.
Replace pavement	<ul style="list-style-type: none"> • Fill potholes • Remove surface irregularities 	<ul style="list-style-type: none"> • Resurface bicycle facilities as a part of street repaving projects • Give consideration to repaving Bicycle Facility Network streets more frequently (include bicycle facilities as a factor in determining the City repaving schedule)
Improve drainage	<ul style="list-style-type: none"> • Unplug individual drains (Seattle Public Utilities) 	<ul style="list-style-type: none"> • Include bicycle facilities in all routine roadway drainage improvements
Replace signs	<ul style="list-style-type: none"> • Replace missing or damaged warning, regulatory, or wayfinding signs 	<ul style="list-style-type: none"> • Replace signs based on manufacturer recommendations related to reflectivity and readability (every 15 to 20 years)
Replace pavement markings	<ul style="list-style-type: none"> • Replace faded or damaged pavement markings that cause confusion for bicyclists or other roadway users 	<ul style="list-style-type: none"> • Annual replacement program to replace bicycle pavement markings based on a regular basis, as needed • Replace bicycle pavement markings when roadways are resurfaced
Ensure bicycle detection at traffic signals	<ul style="list-style-type: none"> • Respond to citizen complaints about loops that do not detect bicycles 	<ul style="list-style-type: none"> • Test sensitivity of inductive loops at each approach to all intersections in the City with actuated signals, including left-turn lanes, to ensure that bicycles can be detected
Provide adequate lighting	<ul style="list-style-type: none"> • Replace burned-out and broken lighting fixtures 	<ul style="list-style-type: none"> • Evaluate adequacy of lighting at arterial roadway crossings on the Signed Bicycle Route System

Action 1.9: Fix spot maintenance problems on existing City streets and bikeways.

Making maintenance improvements on existing on and off road bicycle facilities should be given high priority. Spot improvements, such as removing of specific surface irregularities, filling seams between concrete pavement sections, and facilitating safe railroad crossings should be made on an as-needed basis (see Tables 3 and 4, below). SDOT should address these maintenance problems in conjunction with utility providers (e.g., utility providers may have responsibility for utility hole covers, steel plates, etc.). Public feedback is critical for identifying maintenance issues.

- *Widen congested trail segments.* The City will apply the FHWA Shared Use Path Level of Service methodology¹¹ to congested multi-use trail segments to identify sections that are congested and should be widened. Special attention should be given to trail sections with

¹¹ The FHWA Shared Use Path Level of Service methodology determines the level of comfort on a trail from a bicyclist's perspective. The model uses trail width, total number of users, and percentage of different user types to estimate the amount of delay that bicyclists will experience in passing other trail users.

high use by both pedestrians and bicyclists, since these two types of trail users have different speeds and characteristics.

- *Remove pole stubs at trail entrances.* Pole receptacles for bollards at trail entrances should be replaced with recessed holes that pose less danger to bicyclists and pedestrians or removed completely. These stubs are of special concern at night. For example, the I-90 Trail has many of these pole stubs at its entrances.
- *Fill seams between concrete pavement sections of streets.* There are many streets in the City where the concrete seam is located at or near the most appropriate place for bicyclists to ride (typically on the right side of the outside travel lane near the on-street parking). This can create a problem, particularly for bicyclists with narrow, road bike tires. Several streets that have this issue are important connections in the City's bicycle network. In some cases, this seam is located in a marked bicycle lane. In the short-term, these seams should be filled on the most important streets for bicycle connectivity. As streets are repaved in the future, seams should be located away from where bicyclists would typically ride. Examples include:
 - Renton Avenue S, south of Rainier Avenue S
 - W Emerson Street transition to Ballard Bridge access ramp
 - Montlake Avenue NE near Montlake Bridge
 - E John St and E Olive Way from Bellevue Avenue E to 15th Avenue E

"Please fix roads that have parallel gaps in the pavement. There are a lot of roads that are made of concrete with big gaps running parallel to traffic." --Seattle resident.

- *Make physical improvements to improve railroad crossings.* Multi-purpose trails and roadways should be designed to allow bicyclists to cross railroad lines perpendicular to the rails (or as close as possible). This may include adding pavement to the roadway shoulder area, modifying striping and markings, and posting warning signs. Flange fillers are another possible treatment to improve safety on rail lines that are still in place but no longer active. Top priorities for railroad crossing improvements should be along multi-purpose trails and signed bicycle routes, but all roadways should be designed to provide bicyclists with safe rail crossing opportunities.
- *Repave roadways that have poor pavement condition and provide critical connections in the Bicycle Facility Network.* There are a number of roadways in need of repaving throughout the City. However, several of these roadways are critical to the Bicycle Facility Network but currently have particularly poor pavement condition. Examples of important bikeway connections that should be repaved in the short-term include:
 - Dexter Avenue N between Mercer Street and the Fremont Bridge
 - Montlake Avenue NE near the Montlake Bridge
 - Lake Washington Boulevard S
 - Beach Drive SW
 - Sand Point Way NE
 - Airport Way S
- *Improve the quality of street surfaces by reducing the problem presented by steel plates.* The City's Standard Specifications and Traffic Control Manual requires that whenever steel plates are used, they are shimmed and textured with a no-skid surface to reduce slipping hazards. The locations of these plates should also be highlighted by paint so that bicyclists can prepare to cross them. Further, City inspectors should monitor the installation of steel plates by both City work crews and contractors to ensure that all plates meet these guidelines.

"Please emphasize clearing broken glass off of streets, sidewalks, and bike paths." --Seattle resident

Action 1.10. Prioritize bicycle facility development and maintenance to maximize the use and safety benefits of these investments.

Several factors will be considered to prioritize bicycle facility development and maintenance, in accordance with the Transportation Strategic Plan. The bicycle improvements that will be made first will be those that serve high volumes of users, improve safety, are cost-effective, and improve geographic equity:

User volumes

- Improve bicycle conditions in corridors where there is high potential to increase bicycle trips
- Increase the connectivity and safety of the Urban Trails System, Signed Bicycle Route Network, and other parts of the Bicycle Facility Network

Safety

- Improve bicycle conditions (by providing facilities that make bicycle and motorists behavior more predictable) in areas with high numbers of police-reported crashes
- Improve bicycle conditions proactively in locations where there is a high potential risk of crashes

Cost-effectiveness

- Can be implemented as a part of other transportation projects, such as roadway repaving and reconstruction
- Have been identified as important bicycle facilities in previous plans

Geographic equity

- Provide facility connections in areas where bicycle lanes and trails are missing or disconnected
- Have been identified as important bicycle facilities by the public

CHAPTER 4: SUPPORT FACILITIES

Objective #2: Provide supporting facilities to make bicycle transportation more convenient.

This chapter describes the actions that will be necessary to improve support facilities to make bicycling efficient and convenient to all Seattle residents. In order for bicycling to be a fully viable form of transportation in Seattle, other programs and facilities are needed to compliment the Bicycle Facility Network. This includes integrated bicycle and transit services, adequate bicycle parking at all destinations, showers at employment centers, convenient repair services, and coordination with a variety of other essential components of a multi-modal transportation system.

Connections between Bicycling and Transit

Consistent with the trend in other North American cities over the past twenty years, an increasing linkage has developed in Seattle and King County between bicyclists and transit agencies. While Seattle is served by a number of transit agencies, it is the relationship with King County Metro Transit (KC/METRO) and the newer regional Sound Transit agencies that most define the connection between bicycles and transit in the city. Details on the history of bicycle and transit integration in Seattle and opportunities for improving bicycle access to the KC/METRO and Sound Transit systems are discussed in Appendix J: Bicycle and Transit Integration in Seattle.

Sound Transit TOTAL Access Policy

In 1999, Sound Transit adopted general policies guiding development of service supporting bicycle access to regional transit service. Based on a concept of TOTAL Access (see below), the policies are intended to ensure that the unique characteristics of bicycling and long-haul high-capacity transit are utilized in an efficient manner that accommodates an increasing number of trips accessed by bike.

“Sound Transit is committed to encouraging and providing bicycle access and has adopted a policy of total access for cyclists—on transit vehicles and at stations.”

--Sound Transit website

T: To the transit system
O: On the vehicles
T: Through and across barriers created by the system
A: At the stations
L: Low-cost, effective and efficient

The actions in this section describe how bicycle access can be improved through a number of transit initiatives. Strengthening the connection between bicycling and transit will increase the utility of both transportation modes in Seattle.

Action 2.1: Improve bicycle storage facilities at transit stations.

Bicycle parking improvements are needed at transit stations. This includes providing bicycle racks and lockers at existing transit stations and reserving adequate space during transit station construction to provide future bicycle racks and lockers. The following specific actions will be undertaken:

- *Provide sufficient space for bicycle storage at transit stations and multimodal hubs.* SDOT will work with Sound Transit and KC/METRO to provide bicycle parking at existing transit stations and multi-modal hubs in downtown Seattle, such as Westlake, Colman Dock, King Street Station. These parking facilities should include both short term and long term parking, and should meet the City of Seattle bicycle parking design standards. SDOT will

help participate in the purchase of bicycle racks and lockers at these transportation centers. The PSRC studied transit hub locations in 2002 to determine bicycle parking demand, and this demand should be accommodated. Where space is limited, local transit agencies should consider the opportunities for high-capacity bicycle parking at stations. This type of facility utilizes space efficiently by allowing bicycles to be stacked on two levels.

- *Bicycle parking needs should be considered at heavily-used bus stops.* This will require a separate study to determine if additional bicycle parking is needed at certain bus stops. This study could be conducted as a partnership between SDOT and KC/METRO.
- *Provide sufficient space for bicycle storage at future transit stations.* As transit systems develop in the future, bicycle parking demand should be evaluated using the PSRC Regional BikeStation Project methodology to determine the amount of space that is needed for bicycle racks and lockers. Space for bicycle parking should be included in station designs from the onset of a project.

The Montlake BikeStation project, scheduled for completion in late 2007, will provide lockers for a total of 54 bicycles and rack space for 42 bicycles.

Action 2.2: Continue to fund and promote the use of staffed bicycle facilities.

SDOT and KC/METRO provide funding support for the BikeStation Seattle® transportation center on 3rd Avenue South in Pioneer Square. This facility provides support services to bicyclists, including secure, staffed bicycle parking and resources for repairs, maps, and other information. It is located near the King Street Transit Hub, making it easy for bicyclists to make trips by linking bicycling and transit. Additional locations for staffed bicycle parking stations have been identified by PSRC in conjunction with the City and local transit agencies - funding and implementation of these facilities should continue to be pursued.

Action 2.3: Improve bicycle access to transit stops, stations, and ferries.

SDOT, KC/METRO, and Sound Transit should increase efforts to work together in order to improve bicycle access to the transit system. This includes improving bicycle access to transit stops and stations, providing bicycle storage at stations, and accommodating bicycles on transit vehicles and ferries.

The new bicycle facilities that will be developed as a part of the Bicycle Facility Network will help improve the ability of bicyclists to connect to transit throughout the City. In particular, the signed bicycle route system recommended in this Plan includes connections from main bicycle routes to all existing and future Sound Transit light rail stations and other transit hubs. These bicycle facility improvements will increase accessibility within the catchment area for the transit system.

To complement this effort, coordination will be needed between SDOT and all local transit agencies to improve bicycle access and route information in order to make the transition between modes as seamless as possible. Specifically, the following actions are needed:

- *Integrate bicycle route information into transit route maps and signs.* SDOT should partner with KC/METRO to distribute bike route maps at all locations where transit information is provided. Additionally, KC/METRO and SDOT should work together to develop wayfinding signs that provide information on nearby bike routes.
- *Improve bicycle access and egress to and from rail stations.* SDOT should work with Sound Transit to improve bicycle access to trains in King Street Station and in other future rail stations.
- *Provide bicycle access in proposed streetcar corridors.* The streetcar corridors under construction between Westlake Center and Lake Union include and intersect critical roadways for bicycle connectivity north of Downtown Seattle. As the City further develops its streetcar network, potentially with operations along the curb lane, there will be

increased challenges for bicyclists to avoid the rail flangeway on these streets. Streetcar streets must be designed to facilitate bicycle travel in as safe a manner as possible. In addition, bicycles should be allowed to be brought on board streetcar vehicles so that bicyclists can bypass roadways with tracks. Where possible, on-road bicycle facilities should be incorporated into roadway redevelopment projects associated with streetcar development in South Lake Union and other locations.

- *Design roadways so that bicycles and bus transit co-exist safely and efficiently.* Bikes and bus transit must be seen as compatible, and not subject to design trade-offs. Bicycle lanes should not be removed under the assumption that this will improve bus service; if high-capacity transit is desired, a shared bus/bike facility should be considered. The E-3 Busway is an example where facilities for buses, light-rail transit, and bicycle and pedestrian access co-exist.
- *Improve bicycle access and egress to and from Washington State Ferry terminals.* SDOT will strengthen efforts to further coordinate with Washington State Ferries. These efforts should:
 - Improve bicycle access and egress to and from the Colman Dock Ferry Terminal when the electronic fare system is established. This includes providing designated bicycle waiting space and boarding space (e.g., striped lanes, pathways, and/or waiting areas to be used only for bicyclists). In addition, the loading procedure for bicycles could be modified to reduce conflicts between motor vehicles and bicyclists as they approach the loading area.
 - Improve bicycle waiting areas and other facilities at the Fauntleroy Ferry Terminal to increase the safety and convenience of bicycle access and egress to and from ferries.

“One of the largest daily bicycle access points to Downtown Seattle is through Colman Dock—there are literally hundreds of bicyclists that use the ferry on a daily basis.” - Seattle resident

Action 2.4: Accommodate more bicycles on transit vehicles.

In cities where transit service is fully integrated with bicycle travel, bicyclists are able to bring their bicycles on board transit vehicles in order to use them when they disembark at their destination. While Seattle has one of the more bicycle-accessible transit systems in the nation, growth in the popularity of this “Bike & Ride” service has led to the identification of new service and facility needs. Some options include installing high-capacity bicycle racks on buses, increasing bus service frequency, accepting bicycles on buses at more bus stops, allowing bicycles on board light rail vehicles, and improving bicycle access on ferries.

- *Install racks that can hold three bicycles on the front of all buses.* KC/METRO has installed bike racks on the front of all its buses, allowing two bicyclists to load their bicycles on the bus at the same time. However, two-bicycle racks are often filled during rush hours and on rainy days. KC/METRO and other bus companies serving Seattle have already begun to add capacity for bicyclists by installing racks with space for three bicycles on their buses. KC/METRO should also consider providing additional space for bicycles on-board buses that are used in the proposed Bus Rapid Transit (BRT) system. This may be done by providing special buses with additional rack capacity or allowing seats to flip up and increase storage space for bicycles during times with low ridership. Local transit agencies should also consider allowing bicyclists to ride free on some heavily-traveled roadway corridors that do not have bicycle facilities.
- *Increase the frequency of bus service in corridors where bicycle-on-bus capacity is perceived as a problem.* Even with bicycle racks that hold three bicycles, some high-bicycle-use corridors may have filled racks during peak hours. Lack of space for bicycles on the bicycle racks can be mitigated if buses arrive more frequently. The Transit Now initiative adopted in King County may offer opportunities to increase the frequency of bus service in these corridors.

- *Facilitate safe and efficient bicycle loading onto transit vehicles in Downtown Seattle.* SDOT will work with KC/METRO to explore the possibility of allowing bicyclists to load their bicycles on buses within the Downtown Ride Free Area. While it may not be possible to allow bicyclists to load at all bus stop locations, there may be specific stops where bicycle loading can be permitted. Important considerations include bus headways, street slopes, and stop locations relative to bicycle facilities. In addition, safe and efficient bicycle access to Sound Transit vehicles should be facilitated in the Downtown Seattle Transit Tunnel. In all cases, signage should be provided to indicate when and where bicyclists may or may not load their bicycles.

Bicyclists may load and unload their bicycles at any KC/METRO bus stop, except within the Ride Free Area in downtown Seattle between 6 AM and 7 PM. This is a safety policy to reduce the potential of cyclists being between two buses in heavy downtown traffic. Consideration should be given to modifying this policy to allow bicyclists to board at certain designated stops in the Downtown area (these could be stops located near bicycle route map kiosks).

- *Accommodate bicycles on board Light Rail Transit and other regional transit vehicles.* Sound Transit access policy for bicycles includes accommodating bicyclists on transit vehicles and at transit stations. This applies to Link light rail, Sounder trains, and Sound Transit Express buses. The existing Link light rail system requires bicyclists to remain with their bicycles at all times on board Link trains. Bicyclists may not block stairs or aisles. They must yield priority seating to passengers with disabilities or senior citizens. Train operators may require bicyclists to wait for the next train due to overcrowding. Sound Transit should continue efforts to develop on-board facilities to secure bicycles on light rail vehicles and to make bicycle access safe, convenient, and reliable whenever possible.
- *Continue to count and report bicycle-on-transit ridership.* Bike-on-bus ridership should continue to be counted and recorded by KC/METRO with the purpose of tracking ridership growth over time. In addition, Sound Transit should begin to conduct bike-on-bus counts. The methodology used to count bicycles should count individual boardings. Bicyclist boardings should also be counted on a regular basis on the light rail system when service begins.

Approximately 10,000 bicycles were loaded on KC/METRO buses per week throughout the region in August 2002.

- *Improve bicycle access on the Washington State Ferry System.* The City should work with Washington State Ferries to improve bicycle access on the ferries that serve Seattle. This includes providing racks, hooks, or other storage devices on the ferries to utilize space as efficiently as possible and minimize risk of damage to bicycles and motor vehicles. SDOT should also work with Washington State Ferries to address issues related to bicycle loading and unloading.
- *Allow bicycles on streetcars.* SDOT should work with local transit agencies to allow bicycles on board streetcars. Bicycles may be stored on the transit vehicles with bicycle hooks, bicycle racks, or in designated bicycle space.
- *Encourage the use of bicycle racks on taxis.* Taxi companies are encouraged to install bicycle racks on their vehicle fleets to provide bicyclists with the option to use this private transportation service. This would extend the ability of bicyclists to reach destinations throughout Seattle.

Bicycle Storage

Bicycle parking facilities are currently provided by local agencies in response to public requests and through the development process. The City provides bicycle racks through the SDOT Bicycle Spot Improvement program, and local transit agencies provide bicycle lockers at several transit hubs.

Short- and long-term bicycle parking facilities are also required by the Seattle Municipal code based on the size and type of new developments. The actions below should be taken to improve bicycle storage in Seattle.

Action 2.5: Increase the availability of bicycle parking throughout the City.

Secure bicycle parking located in close proximity to building entrances and transit entry points is essential in order to accommodate bicycling. Secure bicycle parking helps to reduce the risk of bicycle damage and/or theft.

SDOT's Bicycle Spot Improvement Program includes funding to provide bicycle racks on public property adjacent to commercial buildings, multi-family dwellings and schools throughout the City. Through this program, racks are installed at the request of citizens and business or property owners or managers (see Bicycle Rack Location Criteria). The Seattle Municipal Code requires a minimum number of bicycle parking spaces for different types of land uses. When new buildings are constructed or properties undergo other major changes, bicycle racks and lockers are included as a condition of development.

City of Seattle Bicycle Rack Location Criteria

- Racks are installed in public space within City of Seattle limits, usually on a sidewalk with six or more feet of clear sidewalk space remaining.
- Racks are placed at convenient, usable locations in close proximity to building entrances without impeding pedestrians.
- Racks are placed with adequate clearance from curb ramps and crosswalks, street furniture, driveways, and parked cars.
- Racks can be installed in bus stops or loading zones only if they do not interfere with boarding or loading patterns and there are no alternative locations.
- Racks on private property are usually paid for by the property owner. City racks are not available for purchase, but Bicycle Program staff can help property owners choose appropriate racks and installation locations.

Several strategies are needed to increase the availability of bicycle parking in Seattle.

- *Increase funding for bicycle rack installation through the Bicycle Spot Improvement Program.* Bicycle Spot Improvement Program funding should be increased so that more bicycle racks can be installed upon request. In addition, this program should continue to be advertised through the bicycle program website, City brochures, and other sources to increase awareness of opportunities for installing new bicycle parking throughout the City.
- *Re-establish a proactive bicycle rack installation program.* A proactive bicycle rack installation program should be re-established to provide additional bicycle parking in Urban Villages, particularly on commercial and high-density residential blocks of Urban Village areas. Schools, libraries, and community centers should also be targeted for bicycle rack installation. It will be important to work closely with adjacent property owners to make sure that racks are properly located and do not interfere with loading zones and other business related activities.
- *Strengthen legislation to require more bicycle racks and lockers as a part of new developments.* Currently, the City's bicycle parking requirements are included in Title 23 of the Seattle Municipal Code. Changes to portions of this code were proposed in September 2006 and are currently going through the approval process¹² (see Appendix K: City of Seattle Bicycle Parking Requirements). The Code requires a minimum number of off-street bicycle parking spaces to be provided by office, retail, hotel, and residential

¹² Proposed Commercial Code 2006 LU Code Ordinance, Version 8, September 15, 2006

developments in the Downtown Area¹³. It also sets minimum bicycle parking requirements for a wide variety of land uses in other parts of the City.

The changes listed in Table 5 should be made to the Seattle Municipal Code bicycle parking requirements. Table 5 includes recommendations that are above and beyond the requirements proposed in September 2006.

Table 5. Recommended Changes to Existing Bicycle Parking Requirements

Within Downtown Seattle	
Existing Requirement^a	Recommended Requirement
Structures containing 250,000 square feet or more of office gross floor area shall include shower facilities and clothing storage areas for bicycle commuters. One shower per gender shall be required for every 250,000 square feet of office use.	Structures containing 100,000 square feet or more of office gross floor area shall include shower facilities and clothing storage areas for bicycle commuters. One shower per gender shall be required for every 100,000 square feet of office use.
Outside Downtown Seattle	
Currently Proposed Requirement^b	Recommended Requirement
1 long-term bicycle parking space for every 12,000 square feet of medical service building floor area.	1 long-term bicycle parking space for every 4,000 square feet of medical service building floor area/1 long-term bicycle parking space for every 2,000 square feet of medical service building floor area in Urban Center or Station Area Overlay District.
1 long-term bicycle parking space for every elementary school classroom.	4 long-term bicycle parking spaces for every elementary school classroom.
2 long-term bicycle parking spaces for every middle school classroom.	6 long-term bicycle parking spaces for every middle school classroom.
1 long-term bicycle parking space for every 4 units of multi-family housing.	4 long-term bicycle parking spaces for every 4 units of multi-family housing.
1 long-term bicycle parking space for every 20 residents at congregate residences.	4 long-term bicycle parking spaces for every 20 residents at congregate residences.

^aExisting requirements for Downtown Seattle reflect the Seattle Municipal Code adopted in April 2006. Currently proposed requirements for areas outside of Downtown Seattle reflect changes to the Seattle Municipal Code proposed in September 2006 in Commercial Code 2006 LU Code Ordinance, Version 8, September 15, 2006.

^bThe Downtown bicycle parking regulations to not apply to the Pike Market Mixed Zone.

- **Utilize the PSRC bicycle parking demand estimation methodology to determine the amount of bicycle storage needed at transportation facilities.** Sound Transit currently requires space for at least 40 long-term bicycle parking spaces to be provided at all rail transit facilities. More bicycle parking can be required based on area bicycle volumes and travel patterns, topography, nearby residential and employment density, proximity to the Urban Trails and Bikeways System and other existing and planned bicycle facilities, projected transit ridership, etc. In 2002, PSRC developed a methodology to estimate the potential demand for bicycle parking at transit hubs. This methodology should be used to establish appropriate requirements for rail and bus transit hubs, major transfer points, BikeStations, and park and ride lots in the City.

¹³ The Downtown bicycle parking regulations to not apply to the Pike Market Mixed Zone.

- *Increase the amount of bicycle parking provided at public parks, schools, community centers, and libraries.* SDOT will work with the Seattle Parks and Recreation Department, Seattle Public Schools System, and Seattle Public Libraries to ensure that adequate bicycle parking is provided at important public destinations. These destinations include city parks, schools, community centers, and libraries.
- *Consider installing covered, on-demand, longer-term bicycle parking.* SDOT will work with local transit agencies and the Seattle Parks and Recreation Department to examine the possibility of installing bicycle racks for longer-term, secure bicycle parking. Public agencies do not need to administer this bicycle parking program. This type of bicycle parking facility also has the advantages of not needing to be rented, not requiring keys, and not being a potential receptacle for trash. Certain types of covered, on-demand bicycle parking facilities can be locked with a padlock provided by the bicyclist.
- *Provide incentives for operators of private parking facilities to add secure, high-quality bike parking.*

“Required bicycle parking shall be provided in a safe, accessible and convenient location. Bicycle parking hardware shall be installed according to its manufacturer’s instructions, and the Seattle Department of Transportation design criteria, allowing adequate clearance for bicycles and their riders. Directional signage shall be installed when bike parking facilities are not clearly visible from the street or sidewalk. When any covered automobile parking is provided, all required long-term bicycle parking shall be covered. When located off-street, bicycle and automobile parking areas shall be separated by a barrier or painted lines.”

--Seattle Municipal Code, 23.49.019

It will be important for the City and transit agencies to maintain bicycle racks and lockers¹⁴ and use enforcement to deter misuse of these facilities. Abandoned bikes and locks can make existing racks unusable. Other racks can be obstructed by planters, news boxes and other street furniture.

Action 2.6: Require office development and redevelopment projects to include shower and locker facilities.

The City should amend its development ordinance to strengthen existing requirements for shower and locker facilities based on employment densities (see Table 5 for specific recommendations). For employees who are considering bicycling to work, such facilities make it possible to shower and change into work clothes after the commute.

¹⁴While the City will participate in helping to fund bicycle lockers, it does not currently manage or maintain bike lockers and is not likely to manage them in the future. Currently, only Metro provides lockers in the city.

CHAPTER 5: EDUCATION, ENFORCEMENT, AND ENCOURAGEMENT

Objective #3: Provide bicycle education, enforcement, and encouragement programs through partnerships

The Bicycle Facility Network is designed to provide safe, convenient access for bicyclists to travel to destinations throughout Seattle. Like facilities for other transportation modes, this network of bicycle facilities must be used appropriately to be effective. For example, bicycle facilities are designed under the assumption that bicyclists ride the correct direction on streets and stop at red traffic lights and that motorists yield to bicyclists when turning and do not drive or park in designated bicycle lanes.

Therefore, it is not acceptable for bicyclists or motorists to disregard traffic rules. Breaking these laws puts bicyclists and other roadway users at risk and is inconsistent with the City's overarching goal of increasing safety. The education, enforcement, and encouragement programs recommended in this chapter are intended to help grow the number of bicyclists while also increasing safe and appropriate behavior by bicyclists and all other roadway users in Seattle.

Bicyclist Rights and Responsibilities

Bicyclists have the legal right under Washington State law to travel on all roadways other than limited-access roadways (and other locations that are specifically signed to prohibit bicycle travel). Bicyclists share the same responsibility as drivers to operate safely and respectfully in the roadway environment and obey all traffic laws. The bicycle facilities recommended in this Plan are intended to improve bicyclist safety and increase the number of people who bicycle in Seattle. However, bicyclists are not limited to using roadways with designated bicycle facilities.

Bicycle Program Background

Bicycle education, enforcement and encouragement programs have been an important part of the bicycling experience in Seattle for many years. These programs have been implemented by various organizations and agencies in order to improve bicycle safety and encourage more bicycling throughout the City.

"Education of cyclists and drivers is also important. Many cyclists do not ride with consideration for the traffic laws, and many motorists are not aware of how to drive safely around bicyclists."
--Seattle Resident

As the Bicycle Facility Network is built and more people are encouraged to bicycle, new programs will be needed to educate bicyclists and motorists about how to co-exist safely in the roadway environment. Drivers should be expected to treat bicyclists as legitimate users of the road and operate safely around bicyclists. Unsafe behavior by either bicyclists or drivers should be targeted through education and enforcement efforts. In addition, programs will be needed to promote bicycling as a fun, healthy form of transportation in the City.

As the agency responsible for planning, building, maintaining and operating Seattle's transportation infrastructure, SDOT is primarily focused on the "physical" elements of the Bicycle Network. However, the City recognizes that education, enforcement and encouragement programs are also essential activities in order to achieve the goals of this Plan. For that reason, this chapter addresses activities that are needed in order to support existing programs, as well as programs that will be needed in the future to support bicycle transportation in Seattle.

Partners for Bicycle Programs

Bicycle education, enforcement, and encouragement programs are offered by a wide variety of agencies and organizations in Seattle. Appendix L: Partners for Bicycle Programs lists a sample of some of the groups that either already have a role in providing bicycle programs for Seattle residents, or could make good partners for the City in the future.

“Strong efforts aimed at encouraging changes in travel behavior, and educating system users about basic safety and traffic laws, need to be made regularly to have an effect and create mutual respect among all roadway users. Successfully raising public and government awareness about the importance of bicycle and pedestrian transportation, as well as how to best implement regional and local networks and safely use them, will rely upon ongoing collaboration between citizen interest groups and government agencies.”

--Regional Bicycle and Pedestrian Implementation Strategy for the Central Puget Sound Region

The actions listed below are recommended to improve bicycle education, enforcement and encouragement in Seattle.

Action 3.1: Educate Seattle transportation system users about new bicycle facility types.

The City will provide Seattle residents with information about the purpose of new bicycle facility treatments (e.g., bicycle boulevards, shared lane pavement markings, etc.) and safe behaviors for using these facilities. SDOT will work with SPD to educate users about the new facilities, including the following strategies:

- Develop web pages and disseminate information about each treatment
- Install temporary orange warning flags, flashing lights, or cones at locations where new facilities are installed
- Increase police patrols for a period of time as roadway users adjust their behavior after a new facility is installed

Action 3.2: Promote bicycle and pedestrian education and encouragement in Seattle through partnerships with community organizations.

The City will contract with a team of organizations to offer bicycle and pedestrian education and encouragement programs in Seattle. While bicycle safety issues are important, this program must also focus on pedestrian safety, including pedestrian interactions with bicyclists and motor vehicle drivers. Key components of bicycle safety education programs are included in Appendix M: Key Components of Bicycle Education Programs. Examples of services that could be offered through this program include:

- Hands-on bicycle and pedestrian safety training for children and adults
- Bicycle commuter classes
- Bicycle “ambassadors” at intersections in all parts of Seattle who can provide helmets and bicycle lights, assist with bicycle maintenance, and remind bicyclists about laws and safe behaviors
- Media outreach to promote bicycling and increase awareness of bicycle safety, including billboards, direct mail, television and radio advertisements, etc.
- A “Share the Road” campaign to increase safe travel behavior and respect between all types of roadway users
- Community rides in all parts of Seattle that are comfortable for less-experienced bicyclists
- Outreach to lower-income and minority populations that are typically under-represented in the Seattle bicycle community
- “Drive with Care” campaign targeted to improve motorist behavior around bicyclists (similar to City of Chicago)
- Outreach through Seattle Public Utilities newsletters and bills

While contributing to bicycle and pedestrian programs within its own jurisdictional boundaries, the City of Seattle expects PSRC and other localities to contribute to a regional effort to improve bicycle safety. This regional effort should include education of pedestrians, bicyclists, and motorists, enforcement of laws related to pedestrians and bicyclists, and promotion of bicycling and walking as convenient transportation options. Bicyclists, motorists, and pedestrians are not confined to any particular jurisdiction, so all citizens in the region should receive these education, enforcement, and encouragement messages. In addition, the programs can be delivered more cost-effectively on a regional basis. For example, with a regional strategy, the organizations that provide hands-on bicycle and pedestrian safety training can use the same equipment in multiple jurisdictions. Billboards, brochures, and other media messages can also be produced in greater quantities at a lower unit cost if they are distributed regionally.

Action 3.3: Increase enforcement of bicyclist and motorist behavior to reduce bicycle and motor vehicle crashes.

SDOT will work with SPD to enforce laws that reduce bicycle/motor vehicle crashes and increase mutual respect between all roadway users. This enforcement program will take a balanced approach to improving behaviors of both bicyclists and motorists. Motorist behaviors that will be targeted include:

- Turning left and right in front of bicyclists
- Passing too close to bicyclists
- Parking in bicycle lanes
- Opening doors of parked vehicles in front of bicyclists

Bicyclist behaviors that will be targeted include:

- Ignoring traffic control (particularly traffic signals)
- Riding the wrong way on a street
- Riding with no lights at night
- Riding without helmets

Bicyclist safety is a shared responsibility between all roadway users. Enforcement priorities should be established through a collaborative process involving SDOT, SPD, the Bicycle Advisory Board, the Bicycle Alliance of Washington, and the Cascade Bicycle Club.

Action 3.4: Support efforts to obtain funding for bicycle education and enforcement programs.

SDOT will work with local organizations to pursue additional funding for bicycle safety education and enforcement programs (see list of existing programs offered by local organizations above). By providing support to grants and other funding applications, the City can help organizations that conduct education and enforcement to increase their resources and reach more Seattle residents.

Action 3.5: Update and distribute the Seattle Bicycling Guide Map.

As new bikeways are added to the network over the next ten years, regular updates will be needed to the Seattle Bicycling Guide Map to ensure that bicyclists are aware of new routing options, and to reflect changes in the bicycle route network. The maps can be distributed in paper form, be posted online as a .pdf document, and may also be used as the basis for a web-based bicycle route-finding program (see the following action). Similarly, agencies that produce regional bicycle maps and other information of interest to bicyclists should be encouraged to update information relating to Seattle bicycle improvement efforts. In addition, SDOT should work with transit agencies such as KC/METRO, Sound Transit, and Washington State Ferries to distribute the maps.

Action 3.6: Develop an online bicycle route wayfinding program.

An online bicycle route wayfinding program should be developed by the PSRC, with support from SDOT, to help bicyclists determine preferred routes to destinations throughout Seattle and the Puget Sound Region. This program would allow bicyclists to enter their origin and destination and

generate an optimal route to follow, given their experience level, time-sensitivity, willingness to ride on steep hills, or other potential factors. This online program could also include tourist destinations, park amenities, transit access information, school locations and other information that may be useful to bicyclists.

“Implement a computerized wayfinding program.” -- Seattle resident

Action 3.7: Encourage bicycling by displaying bicycle route system maps in key Downtown and Urban Village locations.

Downtown Seattle and the Urban Village Centers are important hubs in the City’s Signed Bicycle Route system. Many routes in the system connect bicyclists between neighborhoods to the Downtown Area. Downtown is an important destination for commuters, recreational bicyclists, tourists, and many potential bicyclists. In addition, the Signed Bicycle Route System connects all Urban Villages, so these key locations should have easy-to-understand information for bicycle wayfinding. Bicycle route system kiosks should be displayed at key locations in the Downtown area, Urban Villages, as well as other key destinations throughout the City such as along the Burke-Gilman Trail in Gas Works Park and at BikeStation Seattle®.

Action 3.8: Promote bicycling as an alternative to driving alone through Transportation Demand Management (TDM) Programs.

Bicycling should continue to be promoted as a non-polluting, healthy form of transportation through Transportation Demand Management (TDM) programs, such as Commute Trip Reduction programs, the SDOT Way To Go Program, and the Healthy Streets Initiative.

- The Washington State Commute Trip Reduction (CTR) Law requires employers to work with employees to reduce the number and length of drive-alone commute trips made to the worksite. The City and SDOT support this law and encourage all commuters to use alternatives to driving alone to work. Employees are encouraged to ask their employers to take actions to improve bicycling as a part of their CTR programs, including:
 - Provide bicycle parking facilities
 - Provide bicycle maps, brochures, and other promotional materials
 - Hold a “bicycle commute challenge” for employees to commute the most days by bicycle
 - Develop agreements with local bicycle shops to provide reduced price items for their organization
- SDOT’s Way To Go Program includes a variety of initiatives intended to improve livability by reducing automobile usage for non-work trips. Improving conditions for bicycling will help achieve this goal, so bicycling should be emphasized as viable mode of travel in Way To Go initiatives, such as the Commuter Cash program and the One Less Car Challenge.

Action 3.9: Expand safe routes to schools to encourage children to walk and bicycle to school.

The City should build on its existing efforts work with the Seattle Public Schools, public health organizations, parent associations, and local walking and bicycling advocacy groups to develop safe bicycle and pedestrian routes to Seattle schools. These routes could be identified as a part of local Safe Routes to Schools programs and could be improved in conjunction with the implementation of the City of Seattle Pedestrian Master Plan.

CHAPTER 6: IMPLEMENTATION

Objective #4: Secure funding and implement bicycle improvements

Implementation of this Plan will be a collaborative effort between a variety of City departments and agencies and several outside organizations. SDOT will lead this effort, so all SDOT staff should be aware of the Plan recommendations and seek to implement them as a part of their regular work. The SDOT Pedestrian and Bicycle Program will provide technical expertise on issues related to bicycling and ensure that implementation of the Plan moves forward.

Key divisions within SDOT for planning and implementing bicycle improvements include:

- Traffic Management
- Street Maintenance
- Capital Projects and Roadway Structures
- Major Projects
- Policy and Planning

Progress on implementing the Plan will be monitored on an annual basis, with the goal of completing most of this Plan by 2016.

Every transportation project offers an opportunity to implement a piece of this Master Plan. Therefore, institutionalizing bicycle improvements will be essential for successful implementation of this Plan. Seattle's Transportation Strategic Plan states that bicyclists' needs should be considered in the planning, design, construction, and maintenance of all transportation projects in the city.

Action 4.1: Provide bicycle facilities as a part of all transportation projects.

In accordance with the City of Seattle's Complete Streets Resolution¹⁵, the City will, to the maximum extent possible:

- Accommodate bicycles as a part of all new roadway projects
- Provide bicycle facilities as a part of all bridge projects (replacement and major retrofit), on the bridge structure and on bridge access ramps and approaches
- Incorporate requirements for bicycle facilities in the City Right-of-Way Improvements Manual, standard specifications, and standard plans.
- Actively seek opportunities to provide bicycle lanes, shared lane pavement markings, and other on-road bicycle facilities as a part of repaving projects (this includes roadways in the Bicycle Facility Network as well as other roadways)
- Develop trails in conjunction with the installation of underground cable, water, sewer, electrical and other public or private efforts that utilize or create linear corridors
- Continue to develop trails in railroad corridors no longer needed for railroad purposes. Where appropriate, develop trails adjacent to trails (e.g. sections of the Elliott Bay and Burke Gilman Trails). Continue to develop trails along utility corridors (e.g. Chief Sealth Trail).
- Piggyback on other types of projects that could potentially include bicycle facilities (e.g., building construction, property redevelopment, utility maintenance, etc.)
- Provide special appropriations or funding to fill in key gaps in the Bicycle Facility Network
- Fix potholes, surface hazards, sight distance obstructions, and other maintenance problems on a regular basis.

¹⁵ The City of Seattle Complete Streets Policy, Resolution 30914, adopted 9/22/06, is in the process of being adopted as an ordinance. Therefore, its language may undergo slight modification through this process.

Routine accommodation of bicycles should also apply to Washington State DOT, Washington State Ferries, Port of Seattle, KC/METRO, and Sound Transit projects within the City.¹⁶

City of Seattle Complete Streets Policy¹⁶

Resolution 30914, Adopted 9/22/06

Seattle's "Complete Streets" Principles

Guiding Principle: To design, operate and maintain Seattle's streets to promote safe and convenient access and travel for all users; pedestrians, bicyclists, transit riders, and disabled users, as well as cars and trucks.

This will be accomplished by:

1. Designing, operating and maintaining the transportation network to improve travel conditions for bicyclists, pedestrians, transit and freight, in a manner consistent with and supportive of the surrounding community;
2. Providing where practical an array of facilities and amenities that are recognized as contributing to Complete Streets, including: street and sidewalk lighting; pedestrian and bicycle safety improvements; access improvements for freight; access improvements in accordance with the Americans with Disabilities Act; public transit facilities accommodation, including but not limited to pedestrian access improvement to transit stops and stations; street trees and landscaping; and street amenities - all consistent with Section 3 of the Resolution; and
3. Implementing policies and procedures with the construction, reconstruction or other changes of transportation facilities on arterial streets to support the creation of Complete Streets including capital improvements, rechannelization projects and major maintenance, recognizing that all streets are different and in each case user needs must be balanced.

Note: The City of Seattle Complete Streets Policy, Resolution 30914, adopted 9/22/06, is in the process of being adopted as an ordinance. Therefore, its language may undergo slight modification through this process.

Action 4.2: Dedicate funding for high-priority bicycle project planning and implementation.

The City will take advantage of existing funding provided through the "Bridging the Gap" initiative and dedicate portions of this funding to critical bicycle projects. Some of the most significant connections that are needed in Seattle, such as bicycle and pedestrian bridges and multi-purpose trails, will not be implemented through routine roadway repaving and reconstruction projects and will instead require an independently-funded capital improvement. In addition, there are a number of street retrofit projects that should be funded through separate, stand-alone projects. The City may be able to obtain funds for these projects by pursuing federal and state grants, or by including them in the line item budget for "Bridging the Gap" initiative funds.

Examples of these projects include (same higher-cost project list as provided at the beginning of Chapter 3):

- Provide a bicycle facility connection between Downtown Seattle and the UW Campus via Eastlake Avenue N
- Complete the Ship Canal Trail

¹⁶ The City of Seattle Complete Streets Policy, Resolution 30914, adopted 9/22/06, is in the process of being adopted as an ordinance. Therefore, its language may undergo slight modification through this process.

- Construct a Chief Sealth Trail Crossing of I-5 between S Spokane Street and S Lucile Street (and provide a trail on the east side of I-5 between the Chief Sealth Trail and the I-90 Trail)
- Construct the Burke-Gilman Trail section between 11th Avenue NW and 17th Avenue NW
- Construct a new bicycle and pedestrian bridge across I-5 between Wallingford and the University District
- Provide a bicycle facility connection between the I-90 Trail and Downtown Seattle
- Construct multi-purpose trail connections from the SR 520 Bridge to the UW Campus and to Downtown Seattle as a part of the bridge reconstruction project
- Either improve the bicycle lanes on Alaskan Way S/E Marginal Way S between S Spokane Street and Downtown or complete the E-3 Busway Trail between S Spokane Street and Downtown
- Either Rehabilitate the existing Ballard Bridge or add a new bicycle and pedestrian bridge adjacent to the Ballard Bridge

Action 4.3: Establish a bicycle facility grant match reserve fund.

The City will develop a bicycle facility grant match reserve fund. This source would make it possible for the City to have matching funds available to take advantage of state and federal grants, even if other City funding sources are not available. To develop this fund, the City could set aside a certain percentage (e.g., 5 percent) of money from current bicycle projects and raise funds from private individuals and organizations. The fund would be secured by the time the “Bridging the Gap” funding initiative is completed. After this investment period, the annual interest from the match reserve fund (3 to 4 percent) will be used to implement bicycle facility maintenance improvements.

Action 4.4: The SDOT Bicycle and Pedestrian Program should provide the necessary staff expertise and commitment to implement this Master Plan within the timeframe identified.

This Master Plan envisions a considerable acceleration in the pace of bicycle facility construction throughout the City. SDOT will hire one or more additional staff members in order to administer programs, design projects, monitor progress, conduct public outreach, and perform other new tasks related to implementation of this Bicycle Master Plan. For some tasks, such as data collection, before and after studies, or bikeway design, it may be more efficient for Program staff to contract with consultants to assist with the work.

Action 4.5: Continue to make minor improvements for bicycling through the Bicycle Spot Improvement Program.

The SDOT Pedestrian and Bicycle Program currently constructs low cost improvements to enhance bicycle safety and convenience through the Bicycle Spot Improvement Program. This program has become a national model that has been emulated by many city and state DOT’s around the country. SDOT should continue to make the following types of improvements through this program:

- Surface improvements (patch potholes, fill seams between concrete panels in the street, replace drain grates, etc.)
- Signing and striping (bicycle lane striping and stenciling, motor vehicle warning signs at trail crossings, etc.)
- Access improvements (adjust electronic detection for bicyclists at traffic signals, traffic island modification, etc.)
- Sidewalk bicycle rack installation
- Other low cost bicycle improvements as appropriate

SDOT has installed over 2,300 bicycle parking racks on sidewalks in business districts since September 1993.

Action 4.6: Continue to receive regular input and guidance from the Seattle Bicycle Advisory Board.

The Seattle Bicycle Advisory Board should continue to provide regular input and guidance to the Pedestrian and Bicycle Program on bicycle issues. This will include monitoring the progress of implementation.

“It is the intent of the City Council to create the Seattle Bicycle Advisory Board which shall advise the City Council, the Mayor, and all the departments and offices of the City on matters related to bicycling, and the impact which actions by the City may have upon bicycling, and shall have the opportunity to contribute to all aspects of the City’s planning processes insofar as they may relate to bicycling.”

--City of Seattle Resolution 25534, May 16, 1977

Action 4.7: Provide bicycle planning and facility design training for appropriate SDOT project-level staff and consultants, and encourage staff from other agencies to attend.

Staff and consultants working on projects that affect bicycle access directly or indirectly should be strongly encouraged to attend training sessions on bicycle planning and facility design. Staff at other agencies, such as Seattle Parks and Recreation, KC/METRO, Sound Transit, Washington State Ferries, etc. should be invited as well. Training includes attending conferences such as Pro-Walk/Pro-Bike, courses offered through professional organizations such as ITE as well as formal and informal (sack lunch presentation) sessions delivered by the Pedestrian and Bicycle Program and/or consultants with an expertise in bicycle and pedestrian planning and engineering. Periodic training may focus on particular topics of importance, such as intersection design, trail design, or innovative design treatments.

Action 4.8: All divisions of SDOT should consult the Bicycle Master Plan when working on projects.

All SDOT divisions should consult this Plan to ensure that the recommended facilities and maintenance practices are implemented in accordance with this Plan and the City’s Complete Streets Policy. For roadway repaving and reconstruction projects, the Bicycle Master Plan recommendation represents the first alternative that should be considered. However, further study and additional public involvement may ultimately result in an even better strategy to provide bicycle access. The SDOT Pedestrian and Bicycle Program should be consulted when technical guidance is needed on bicycle issues.

In addition, the Bicycle and Pedestrian program staff should review other City planning documents, including the Seattle Transit Plan, Freight Mobility Strategic Action Plan and the Pedestrian Master Plan (anticipated in 2008) when proposing implementation of the Bicycle Facility Network.

Action 4.9: Integrate the recommendations of the Bicycle Master Plan into other City ordinances, plans, and guidelines.

The recommendations of this Plan should be integrated into other City policy documents. This includes updating the Right-of-Way Improvements Manual, Transportation Strategic Plan, City ordinances, design guidelines, and other written policies (see Appendix N: Integration of Bicycle Recommendations into other Transportation Plans and Guidelines).

The SDOT Right of Way Improvements Manual will be updated with all bicycle design guidelines that are included in this Plan. All new bicycle design standards will be similarly incorporated into the SDOT Standard Specifications.

SDOT will redefine the City's bicycle classifications based on the systems identified in this plan. The Transportation Strategic Plan currently classifies bicycle facilities into urban trails and bicycle streets. These classifications of roadways and trails should be revised to include:

- Bicycle Facility Network
- Signed Bicycle Routes

Action 4.10: Coordinate within SDOT and between SDOT and other agencies and organizations where necessary to implement the Bicycle Master Plan.

The SDOT Pedestrian and Bicycle Program should be included in the scoping and review of all plans, projects and programs that may provide opportunities to promote and implement recommendations of this Plan. In general, this includes most SDOT initiatives. Likewise, the Bicycle and Pedestrian Program should consult other SDOT modal programs and agencies when implementing its policies, plans and programs.

Implementation of this Plan will require significant coordination between SDOT and other organizations. The roles of key partners are discussed in relation to specific recommendations in previous sections of this Plan, and are summarized below:

- Seattle Parks and Recreation Department (trail development; maintenance of trails in parks)
- Seattle City Light (maintenance of trails in utility corridors)
- Seattle Public Utilities (drainage)
- Department of Planning and Development (bicycle parking and shower requirements)
- Puget Sound Regional Council (regional non-motorized planning, administration of federal and state funding for grant funded projects, regional wayfinding coordination, regional strategy for bicycle parking at transit hubs, incorporation of more detailed questions about bicycle and pedestrian trips in the regional transportation survey; bicycle promotion)
- Transit Agencies (bicycle access to stations, space for bicycle storage at stations, bicycle facilities on transit vehicles, bicycle-on-transit counts)
- Advocacy Organizations (bicycle education and encouragement)
- Seattle Police Department (enforcement of bicyclist and driver behavior)
- Health Agencies

Action 4.11: Update the Bicycle Master Plan on a regular basis.

As the Plan recommendations are implemented, priorities for bicycle improvements may change and new needs and opportunities may be identified. The Bicycle Master Plan will be updated on a regular basis as a part of all Transportation Strategic Plan Updates (typically every five years). In addition, the list of short-term projects for implementation should be revised by SDOT on an annual basis, within the framework of the overall Bicycle Master Plan.

Action 4.12: Evaluate new bicycle facility treatments.

New bicycle treatments should be evaluated to determine their effectiveness. Brief studies of these facility treatments should be done in the first three years after the Plan is adopted, and the results of these evaluations will be used to refine, adjust and guide the future use (or discontinuation) of these treatments. This includes evaluating the following facilities (potential evaluation measures are shown in parenthesis):

- Shared lane and bicycle lane pavement markings (evaluate their use by bicyclists, placement relative to parked cars and vehicles in travel lanes, maintenance needs, effects of any travel lane rechannelization and/or narrowing on the safety and comfort of all roadway users)
- Signage and wayfinding (assessment by stakeholders, use by bicyclists, interpretation of signs, effectiveness of sign and/or pavement marking placement)
- Roadway crossing treatments (use of right-of-way space, effectiveness of warning and regulatory signs, effectiveness of pavement markings)

- Bicycle boulevards (use by bicyclists, use of right-of-way space, change in traffic speeds, effectiveness of pavement markings)

The brief studies should include behavioral observations (of bicyclists and other roadway users) and user surveys to gauge public understanding of and satisfaction with the new facilities. Results from these studies should be incorporated into Plan updates.

Action 4.13: Monitor progress using performance measures.

An important aspect of evaluating progress in implementing this Plan is to establish performance measures that are reported on a periodic basis. Measures are described in Chapter 7 to quantify the overall goals of the Plan and objectives described in each chapter. Several new performance measures have been established. For each of these new performance measures, SDOT will collect the data necessary to establish baseline measurements in 2007.

The performance measures should be evaluated on a bi-annual basis to ensure that they are the most appropriate, cost-effective measures for assessing progress towards the Plan goals. Performance monitoring will be led by the SDOT Policy and Planning Division, with support from the SDOT Pedestrian and Bicycle Program. Monitoring should be reported to the Seattle Bicycle Advisory Board on a periodic basis, depending upon the schedule for data collection.

SDOT's performance measures should be coordinated and integrated with external bicycle transportation monitoring efforts, such as a "Bicycle Plan Implementation Report Card". Outside groups may monitor progress on the Bicycle Master Plan goals (bicycle use and safety), facility network development, and people's perceptions of bicycling (from both bicyclists and non-bicyclists). These groups may gather this information through online surveys and random-phone surveys.

Bikeway Implementation Strategies

The following are implementation strategies for bikeways that are recommended in this Plan (identified in the GIS database of Bicycle Facility Network recommendations):

Construct or Reconstruct

This category includes construction and reconstruction of roadways, multi-purpose trails, bridges, and pedestrian/bicycle overpasses and underpasses. Construction refers to projects to develop facilities that did not previously exist; reconstruction refers to changes to existing facilities.

In accordance with the Seattle Complete Streets Policy, bicycles should be accommodated any time a new road is constructed or an existing road is reconstructed. Seattle roadways should be designed according to the bicycle facility design guidelines in Appendix E: Bicycle Facility Descriptions, Appendix F: Guidance for Retrofitting Seattle Streets to Create Dedicated Bicycle Facilities, and Appendix H: Roadway Crossing Design for Bicycles. This may involve adding pavement to the side of existing two-lane roadways that have informal parking in gravel areas adjacent to the roadway to provide shoulders or bicycle lanes and on-street parking pockets in appropriate locations. Since Seattle is a built environment, opportunities to provide this type of treatment are limited and will typically be found in the far north and south parts of the City where roadways have not been developed with curb and gutter.

All new or replacement bridges should accommodate bicycles with bicycle lanes on both sides of the bridge, or in some cases, a separated multi-purpose path. If the bridge is in a developed area or an area that may experience high pedestrian use in the future, separate facilities should be provided for bicyclists and pedestrians.

The current Federal law for bicycle and pedestrian access on bridges was established in the Transportation Equity Act for the 21st Century (TEA-21) and re-affirmed by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). This law states:

“In any case where a highway bridge deck is being replaced or rehabilitated with Federal financial participation, and bicyclists are permitted on facilities at or near each end of such bridge, and the safe accommodation of bicyclists can be provided at reasonable cost as part of such replacement or rehabilitation, then such bridge shall be so replaced or rehabilitated as to provide such safe accommodations.” (23 U.S.C. Section 217)

While opportunities to develop new multi-purpose trail corridors are limited by the existing built environment of the City, there are a number of gaps in existing trails and important trail extensions that should be completed as a part of this Plan. In addition, several new corridors have been identified for new trails to be constructed.

Add Pavement Markings

Some roadways can accommodate new bicycle lane stripes, bicycle lane markings, or shared lane pavement markings without any other changes. While there are a limited number of locations throughout the City where it is possible to simply add striping or markings, this is a relatively low-cost treatment that can often be done quickly.

Travel Lane Narrowing (Lane Diet)

Some Seattle streets have travel lanes that can be narrowed to provide additional space for on-road bicycle facilities. Lane diets can be done during either repaving projects, or by grinding out existing markings and replacing them with new markings.

Repaving projects provide a clean slate for revising pavement markings. Consistent with the City’s Complete Streets Policy, during road repaving projects, the roadway should be restriped to create bicycle lanes and shoulders (in some cases the City can narrow travel lanes to a minimum 10-foot width, depending on traffic speeds and composition). In addition, if a roadway does not have a curb and gutter and the roadway edge is relatively flat with few obstructions, the total pavement width can be widened to include paved shoulders or bicycle lanes. Accessible curb ramps must be added for pedestrians during repaving projects.

Grinding projects involve removing existing lane stripes as well as providing new striping for bicycle lanes, shared lane pavement markings, or edgelines. Since there are many roadways that will not be repaved in the next several years, existing markings will need to be removed through grinding in order to create the recommended bicycle facilities.

Travel Lane Rechannelization (Road Diet)

There are a number of streets in Seattle where space for bicycle lanes or other on-road bicycle facilities could be provided by removing existing travel lanes. This treatment is recommended for roadways where it is desirable to improve pedestrian crossings at multiple locations, add bicycle lanes and climbing lanes, and reduce rear-end and turning crashes. A road diet often involves converting an existing four-lane roadway to a two-lane roadway with a center-turn lane. This allows bicycle facilities to be installed as well as raised median islands or a crossing island. This treatment reduces bicycle and pedestrian crossing distance and exposure to vehicular traffic, and has been shown to improve motor vehicle flow and reduce rear-end and left-turning crashes when used in appropriate locations.

Removing travel lanes may or may not require tradeoffs between travel modes within a roadway corridor. An engineering and policy analysis must be conducted to evaluate the impact of removing travel lanes on all modes. This includes considering factors such as:

- Pedestrian crossing opportunities and safety
- Transit capacity and performance (additional transit operational analysis is needed for UVTN corridors)
- Bicycle network connectivity
- Peak-hour motor vehicle capacity
- Access to adjacent businesses

- Opportunity to reduce crashes of all types
- Opportunity to reduce vehicle travel speeds, thereby reducing injury severity to pedestrians and bicyclists involved in collisions
- Roadway substructure (if part of the roadway that was formerly a median or streetcar lane is reconfigured to carry heavy trucks, there may be additional maintenance costs)

In UVTN corridors, transit speed and reliability is a priority consideration due to its existing and/or planned ability to move large numbers of people.

Consolidate On-Street Parking to One Side of the Roadway

Consolidating on-street parking to one side of the street provides additional space for bicycle lanes or climbing lanes. Since available on-street parking is limited in many neighborhoods, this action is recommended only in areas where significant excess capacity exists and where it does not cause too many people to have to cross the road to reach their parked cars.

Remove On-Street Parking from both Sides of the Roadway

Removing existing on-street parking provides additional space for bicycle lanes or climbing lanes. In some cases, parking removal is also needed to complete multi-purpose trails. This action is relatively rare. It is used only when the parking is under-utilized or it is long-term commuter parking (as opposed to residential or retail parking). The SDOT Transportation Strategic Plan (TSP) identifies strategies for managing parking wisely (see pages 93-98 of the TSP).

Allow Full-Time On-Street Parking

It is not possible to provide on-street bicycle facilities when on-street parking is restricted during peak hours, because the correct riding position for bicyclists changes depending on the presence of parked cars. Allowing full-time on-street parking can sometimes make it possible to provide bicycle lanes, climbing lanes, or shared lane pavement markings adjacent to parked cars. In order to use this strategy, traffic patterns must be studied to determine if it is feasible to lift parking restrictions. An engineering analysis is needed for UVTN corridors to determine potential impacts to transit speed and reliability.

Calm Traffic on the Street

In order to create bicycle boulevards, non-arterial roadways will typically require traffic calming treatments to slow motor vehicle speeds and make bicycling conditions more comfortable. These treatments may include traffic circles, chicanes, traffic diverters, and other measures. Detailed information regarding the SDOT traffic control program can be found online at <http://www.seattle.gov/transportation/trafficcircles.htm>.

Post Bicycle Route Signs

This Plan recommends that the City of Seattle remove its existing signed bicycle routes and develop a new signage system to provide more direct bicycle connections between key destinations in the City. This new signage system should continue to be updated in the future to ensure that the signs are as effective as possible at helping people find destinations. The new signed bicycle route system is discussed in Chapter 3.

Cost Estimates

Rough cost estimates for implementing this Plan are provided in Appendix O: Cost Estimates. In many cases bicycle facility improvements can be provided as a part of larger transportation projects, such as a roadway corridor reconstruction project. The cost estimates for this Plan include both construction and design (see Appendix O).

Implementation Schedule

A majority of the Bicycle Master Plan recommendations will be implemented over the next 10 years. This includes recommendations for bicycle facilities, programs, and institutionalization.

The implementation table summarizes the timing of the major recommendations of this Plan (see Table 6).

Bicycle Facility Phasing

The bicycle facility improvements that are identified in this Plan will be constructed over the next 10 years. Some improvements will be made immediately after the Plan is adopted, while others will take longer to design and develop (see Figure 5: Bicycle Facility Network Development). Therefore, the recommendations are divided into four phasing categories (identified in the GIS database of Bicycle Facility Network recommendations):

- Short-Term (0 to 3 years after Plan adoption)
- Medium-Term (0 to 6 years after Plan adoption)
- Long-Term (0 to 10 years after Plan adoption)
- Future (0 to more than 10 years after Plan adoption)

Figure 5. Bicycle Facility Network Development (see next page)

While a project may be included in the medium- or long-term category, the City should take advantage of opportunities that arise in the short-term to develop the project (e.g., grant funding, piggybacking on other projects, etc.). This is why all phasing categories begin immediately after the Plan is adopted.

Short-Term Recommendations (completed by 2009)

Short-term projects will help create early successes that will help build momentum for other recommendations of the Plan. Many of these projects will be done where it is relatively easy to add bicycle lanes, climbing lanes, and shared lane pavement markings to roadways. Wherever possible, bicycle route signs should be posted during this time period (for some routes, new signals and other crossing improvements will be needed before the signs can be installed). Short-term projects will also include several bicycle facilities that are more challenging to implement in places where critical Bicycle Facility Network gaps exist.

Medium-Term Recommendations (completed by 2012)

Medium-term projects tend to include more complex bicycle facility improvements as a part of capital projects. These include many projects that require repaving or reconstruction of roadways, as well as some re-striping projects. Many of the Urban Trails should be completed within the medium-term timeframe.

Long-Term Recommendations (completed by 2016)

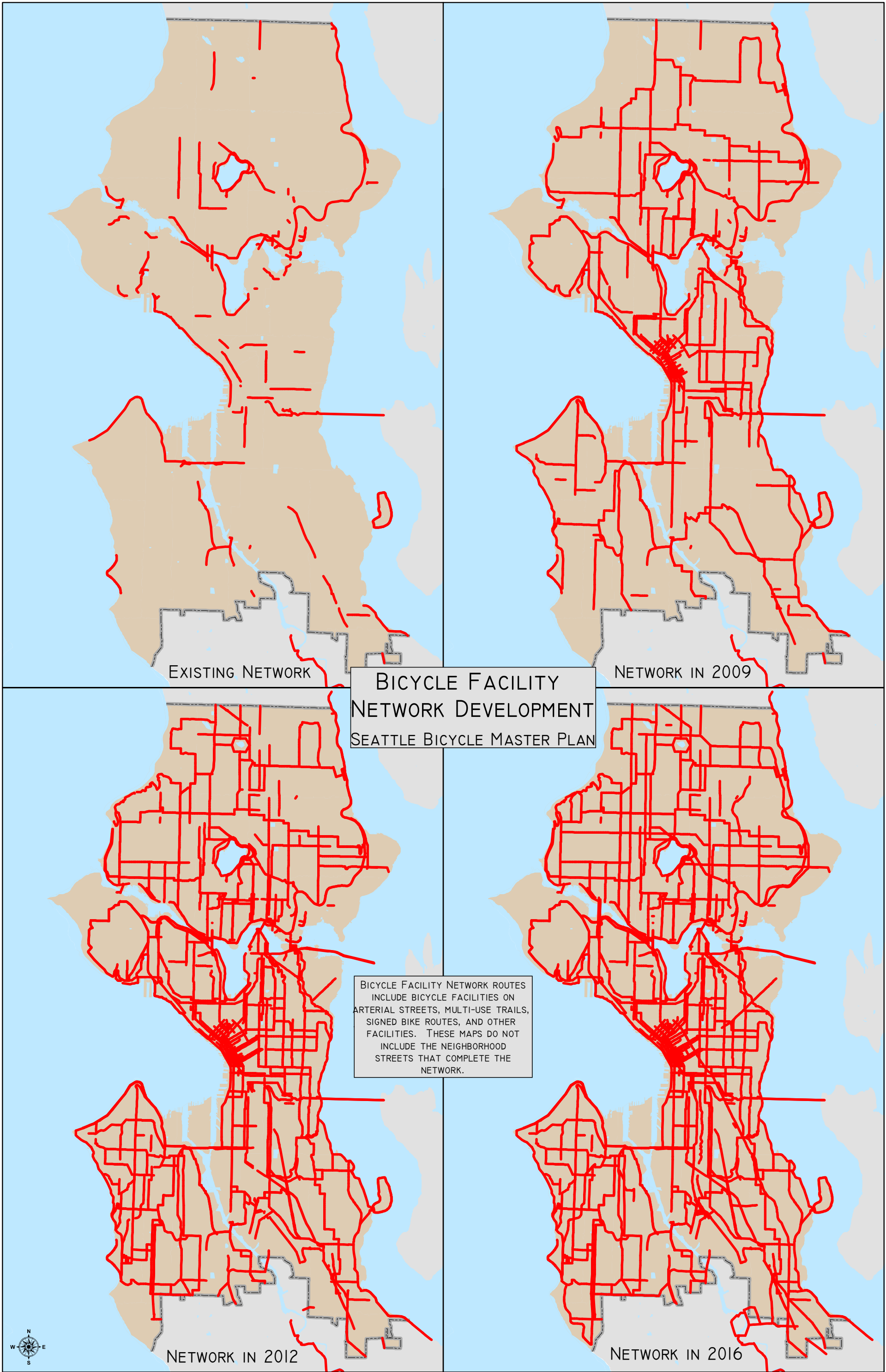
Long-term projects are capital projects that will require several years to program in the budget, design and construct. These include Urban Trails that have not been funded or designed and some new bicycle and pedestrian bridges.

Future Recommendations (completed beyond the 10 year planning horizon)

There are several critical connections in the Bicycle Facility Network that will require significant planning, design, public involvement, capital investment, and construction time. These future category projects include new bicycle and pedestrian bridges, bicycle facilities that will be built as part of larger bridge rehabilitation or replacement projects and major roadway reconfigurations.

Future Vision

This Plan not only establishes the vision, but also very practical steps that are needed in the future to ensure that Seattle will become a world-class city for bicycling. This Plan is an important first step - much work lies ahead. By providing the necessary human and financial resources to accomplish this Plan, Seattle could very well exceed its goals to triple the amount of bicycling and reduce the bicycle crash rate by one-third. It will therefore be important in the future to measure



progress, reassess priorities, and strive to further increase the use and safety of bicycle transportation as the City moves forward with the implementation of this Bicycle Master Plan.

Possibilities that have been suggested by citizens and should be considered as bicycling increases throughout the City are listed below.

- Increasing the number of neighborhood roadways designated as bicycle boulevards.
- Reconfiguring roadways with fewer travel and/or narrower lanes and more space for bicycle facilities.
- Making intersection improvements to allow bicyclists on non-arterial streets to safely cross arterial streets.
- Focusing on bridges so that over time, all bridges provide safe, convenient access for bicycles.
- Installing new types of bicycle facilities at intersections (more bicycle boxes, bicycle turn pockets, traffic signals for bicycles only, special signal phasing for bicyclists).
- Providing more bicycle and pedestrian bridges and underpasses across freeways and other major roadways (this increases the number of route choices that are available to bicyclists).
- Converting on-street parking into space used for bicycle facilities.
- Encouraging commercial businesses to front on multi-purpose trails.
- Providing high-capacity bicycle parking in more retail areas, parks, schools, and public buildings such as libraries and community centers.
- Creating staffed bicycle facilities offering high-capacity parking, repairs, and rentals at more transit hubs.
- Ensuring that all new commercial, office, and industrial buildings are equipped with lockers and showers for bicyclists.

Implementing the recommendations of the Bicycle Master Plan is an important first step in an ongoing commitment that will help establish these future possibilities.

Table 6. Implementation Schedule (Part 1)

1. BICYCLE FACILITIES Recommendations	SDOT Partners	Implementation Schedule						
		Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Future Years
Short-Term Bicycle Facilities for Segments and Roadway Crossings	W, PR, B							
Medium-Term Bicycle Facilities for Segments and Roadway Crossings	W, PR, B							
Long-Term Bicycle Facilities for Segments and Roadway Crossings	W, PR, B							
Urban Trails and Bikeways Network	PR, W, B							
Signed Bicycle Routes	B, PR, PS							
Routine Bicycle Facility Maintenance	W, PR	(See Maintenance Text and Table)						
Spot Bicycle Facility Maintenance	W, PR	(Make Spot Improvements As Needed)						
Negotiate/Renegotiate Maintenance Agreements	PR, L							
Volunteer Assistance with Maintenance	BC, C, BU, S	(Assistance with Maintenance As Needed)						
Track Citizen Complaints and Maintenance Requests	PR, L, B							

B = Seattle Bicycle Advisory Board
 BC = Bicycle Clubs/Advocacy Organizations
 BU = Seattle businesses
 C = Community volunteer groups
 EO = Elected officials
 F = Washington State Ferries
 G = City of Seattle government agencies (all levels)
 HE = Local health organizations
 L = Seattle City Light

M = King County Metro Transit (METRO)
 N = Neighboring municipalities
 O = Outside contractors
 PD = Seattle Metropolitan Police Department
 PR = City of Seattle Parks and Recreation Department
 PS = Puget Sound Regional Council
 S = Seattle Public and Private Schools
 ST = Sound Transit
 T = Seattle tourism organizations
 W = Washington State Department of Transportation (WSDOT)

Table 6. Implementation Table (Part 2)

2. SUPPORTING BICYCLE FACILITIES		Implementation Schedule						
Recommendations	SDOT Partners	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Future Years
Provide Bicycle Racks and Bicycle Lockers	M, ST, BU, S, BC							
Strengthen Bicycle Parking Requirements	EO, BU							
Fund and Promote Staffed Bicycle Facilities	PS, ST, M							
Improve bicycle access to transit	ST, M, F, PS							
Improve Bicycle Storage at Transit Stations	ST, M, PS							
Accommodate More Bicycles on Transit	M, ST, F							

B = Seattle Bicycle Advisory Board

BC = Bicycle Clubs/Advocacy Organizations

BU = Seattle businesses

C = Community volunteer groups

EO = Elected officials

F = Washington State Ferries

G = City of Seattle government agencies (all levels)

HE = Local health organizations

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Table 6. Implementation Table (Part 3)

3. BICYCLE PROGRAMS Recommendations	SDOT Partners	Implementation Schedule						
		Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Future Years
Support Efforts to Obtain Funding for Programs	BC, B							
Update and Distribute Bicycle Map	BC, PR, BU, T, M, ST, F							
Increase enforcement related to bicycling	PD							
Develop Online Bicycle Route Wayfinding System	PS, BC							
Promote Bicycling through the Way To Go Program	BC, HE							
Provide Bicycle Safety Education/Training	BC, S, N, PS							
Donate and Sell Bicycle Helmets	BC, BU							
Provide Bicycle Commuter Assistance	BC, BU							
Expand Safe Routes To Schools Programs	S, BC							
Provide Websites for Bicycle Education and Promotion	BC							
Organize and Promote Bicycle to Work Day	BC, BU, HE							
Promote Bicycling in Regional TDM Programs	BC, HE							
Organize and Promote Bicycle Saturdays and Sundays	PR, HE, BC							

B = Seattle Bicycle Advisory Board

BC = Bicycle Clubs/Advocacy Organizations

BU = Seattle businesses

C = Community volunteer groups

EO = Elected officials

F = Washington State Ferries

G = City of Seattle government agencies (all levels)

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ST = Sound Transit

T = Seattle tourism organizations

W = Washington State Department of Transportation (WSDOT)

Table 6. Implementation Table (Part 4)

4. PLAN FUNDING AND IMPLEMENTATION Recommendations	SDOT Partners	Implementation Schedule						
		Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Future Years
Establish Dedicated Bicycle Funding Sources	EO, B							
Add Staff to SDOT Pedestrian and Bicycle Program	EO, B							
Continue to implement Bicycle Spot Improvement Program	B							
Utilize Contractors for Bicycle Projects	O							
Receive Oversight from Bicycle Advisory Board	B							
Offer Bicycle Planning and Facility Design Training	W, M, ST, PS, O							
Review Bicycle Master Plan Recommendations for all Projects	O							
Consult Pedestrian and Bicycle Program on all Projects	O							
Integrate Plan Recommendations into Other Guidelines	EO							
Update Bicycle Master Plan	O, BC							
Evaluate New Bicycle Facility Treatments	O, B							
Monitor Progress Using Performance Measures	B, O	(See individual performance measures for data collection timing)						
Prepare Bicycle Benchmarking Report	B, O, BC							
Reconsider Performance Measures	B, O							

B = Seattle Bicycle Advisory Board
 BC = Bicycle Clubs/Advocacy Organizations
 BU = Seattle businesses
 C = Community volunteer groups
 EO = Elected officials
 F = Washington State Ferries
 G = City of Seattle government agencies (all levels)
 HE = Local health organizations
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CHAPTER 7: PERFORMANCE MEASURES

As described in Chapter 6, several performance measures should be monitored to determine the amount of progress being made toward achieving the goals and objectives of the Plan. The measures summarized in Table 7 and described below are intended to quantify the overall goals of the Plan and objectives described in the previous chapters. These performance measures will be reviewed and updated every two years to ensure that the City continues to use the best available metrics to assess Plan implementation. Performance monitoring will be led by the SDOT Policy and Planning Division, with support from the SDOT Pedestrian and Bicycle Program.

Table 7. Bicycle Master Plan Performance Measures

	Performance Measure	Baseline Measurement	Performance Target	Data Collection Frequency	Data Collection Responsibility
Goal 1	Number of bicyclists observed at counting locations throughout Seattle	To be counted in 2007	Triple the number of bicyclists between 2007 and 2017	Every two years	SDOT, Volunteer groups, Bicycle advocacy organizations
Goal 2	Number of reported bicycle crashes per total number of bicyclists counted and annual traffic volumes	To be calculated in 2007	Reduce the bicycle crash rate by one third between 2007 and 2017	Every two years	SDOT, Law enforcement agencies, Volunteer groups, Bicycle advocacy organizations
Objective 1	Percentage of Bicycle Facility Network Completed	65 miles of existing facilities	Provide 450 miles of recommended facilities by 2017 (includes existing)	Every two years	SDOT Policy and Planning Division & SDOT Pedestrian and Bicycle Program
	Percentage of bicycle-related spot maintenance requests addressed in two working days or less	95 percent	99 percent	Every year	SDOT Maintenance Division & Seattle Department of Parks and Recreation
Objective 2	Number of bicycle racks installed through the SDOT Bicycle Parking Program.	Approx. 3,000 existing bicycle racks	Provide 11,000 racks by 2017 (includes existing)	Every two years	SDOT Pedestrian and Bicycle Program
Objective 3	Number of Seattle Bicycling Guide Maps distributed	23,338 maps distributed in 2005	150,000 bicycle maps to be distributed between 2007 and 2017	Every year	SDOT Pedestrian and Bicycle Program or its designated representative
Objective 4	Percentage of targeted SDOT staff who participate in training on bicycle issues.	To be counted in 2007	100% of targeted staff participating in training every year	Every year	SDOT Pedestrian and Bicycle Program
	Number of bicycle project grant applications	To be tracked in 2007	At least one grant application for	Every year	SDOT Policy and Planning Division

	applied for and obtained for bicycle programs		every available funding opportunity		
	Number of Bicycle Spot Improvements Completed	To be counted in 2007	Depends on needs & priorities set each year	Every year	SDOT Pedestrian and Bicycle Program

Performance Measure Framework

This Plan establishes two types of performance measures. The performance measures used to monitor progress towards the goals will quantify long-term trends in bicycle use and safety. The performance measures related to the objectives are strategic—they will calculate the amount of progress that has been made toward specific 2017 performance targets.

Several of the performance measures have been used previously by SDOT, while others are new. For each new performance measure, SDOT will collect the data necessary to establish baseline measurements in 2007. A few of the performance measures listed below are recommended for organizations other than SDOT to consider. These measures are important metrics for tracking progress on this Plan, but they will not be included in official SDOT performance reports.

Long-Term Performance Measures

Long-term performance measures monitor progress towards the goals of increasing bicycle use and improving bicycle safety.

Goal 1: Increase use of bicycling in Seattle for all trip purposes. Triple the amount of bicycling in Seattle between 2007 and 2017¹⁷.

Long-Term Performance Measure 1.1 (New): Number of bicyclists observed at counting locations throughout Seattle. Bicycle counts should be taken at up to 30 locations throughout the City every other year to benchmark the amount of bicycling in the City. Count locations could include Downtown entry points, locations on each of the City's major trails, arterial roadways with bicycle lanes or shared lane pavement markings, and intersections of arterial roadways with existing or planned bicycle facilities. SDOT should continue to support and work with the Cascade Bicycle Club on counts—especially the ones done on Bike to Work Day and on the Burke Gilman Trail. The official counts for this performance measure should be taken around the same date each year, on the same day of the week, and under similar weather conditions. In other cases, one-time before and after counts should be taken to measure increases in bicycle use related to a specific bicycle lane, shared lane pavement marking, or trail project.

Additional bicycle counts may be obtained by requiring bicycles to be included in current, manual intersection mid-block traffic counts. This data set would not represent all bicycle activity throughout Seattle, but would begin to provide some basic data on the use of bicycle facilities. The City will need the assistance of local bicycle advocacy organizations to take these counts. In addition, pneumatic tubes should be used to reduce the labor required to count bicyclists on trails. Bicycle counting technologies, such as video and infrared detection should be explored for counts in all types of locations, and the City should move toward adopting these technologies.

- ***Data Collection Responsibility:*** SDOT, Volunteer groups, Seattle area bicycle advocacy organizations
- ***Data Collection and Reporting Frequency:*** Every Two Years

¹⁷Tripling the amount of bicycling is contingent upon the completion of key connections in the Bicycle Facility Network. The Plan identifies 20 capital projects to make these key connections (see Chapter 2). The amount of bicycling is measured by counting bicyclists at a consistent sample of locations in the City.

Long-Term Performance Measure 1.2 (Recommended for PSRC consideration): Bicycle mode split. Bicycle mode split should be documented every five years through the Puget Sound Regional Travel Survey. Documenting mode shift from personal automobile use to bicycle use is an important benchmark for demonstrating that the City of Seattle is achieving its pollution reduction goals and meeting the Kyoto Protocol. PSRC should improve the survey and reporting methodology to capture an accurate sample of bicycling trips and to report data for each jurisdiction in the region separately. This will allow the City of Seattle to benchmark progress towards shifting single-occupant vehicle trips to bicycle trips.

- *Data Collection Responsibility: PSRC*
- *Data Collection and Reporting Frequency: Every Five Years*

Goal 2: Improve safety of bicyclists throughout Seattle. Cut the rate of bicycle crashes by one third between 2007 and 2017¹⁸.

Long-Term Performance Measure 2.1 (New): Number of reported bicycle crashes per total number of bicyclists observed during the bi-annual bicycle count and annual traffic volumes. This measure would compare crash trends in terms of bicycle and pedestrian exposure. Exposure would be approximated using one or more of the following: the annual bicycle counts at up to 30 locations throughout the City or the total number of bicycle trips in the City reported by the Puget Sound Regional Travel Survey (assuming that it is improved to capture more bicycle trips). The number of reported bicycle crashes should also be normalized by changes in annual traffic volumes, as observed at a consistent sample of locations (such as regular traffic count locations reported on the Annual Traffic Count Map). Note that police-reported crashes do not represent all bicycle collisions¹⁹.

- *Data Collection Responsibility: SDOT, Law enforcement agencies, Volunteer groups, Seattle area bicycle advocacy organizations*
- *Data Collection and Reporting Frequency: Every Two to Five Years*

Strategic Performance Measures

Strategic performance measures calculate the amount of progress that has been made toward specific 2017 performance targets.

Objective 1: Develop a safe, connected, and attractive network of bicycle facilities throughout the City

Strategic Performance Measure 1.1 (New): Percentage of Bicycle Facility Network completed. This measure will track progress toward completing the entire recommended 450-mile Bicycle Facility Network by 2017. An additional option that will be considered is tracking the percentage of network miles completed for different facility types (e.g., bicycle lanes, climbing lanes, shared lane pavement markings, multi-purpose trails, bicycle boulevards). This performance measure builds on SDOT's existing measure of the number of bicycle lane miles created each year.

¹⁸The rate of bicycle crashes is the number of bicycle crashes in a year divided by the number of bicyclists counted at the sample locations and by the annual change in motor vehicle traffic volumes throughout the City.

¹⁹A study by Stutts and Hunter of a sample of cases collected at eight hospital emergency rooms in three states, showed that only 56 percent of the pedestrians and 48 percent of the bicyclists were successfully linked to cases reported on their respective state motor vehicle crash files^a. This study looked at only the most serious crashes (involving emergency room treatment). We can assume that less-severe crashes were accurately reported at an even lower rate. Good sources on police-reported bicycle and pedestrian crashes include:

a) Stutts, J.C. and W.W. Hunter. "Police-reporting of Pedestrians and Bicyclists Treated in Hospital Emergency Rooms," Transportation Research Record No 1635, Transportation Research Board, 1998. P. 88-92.

- *Data Collection Responsibility: SDOT Policy and Planning Division and SDOT Pedestrian and Bicycle Program*
- *Data Collection and Reporting Frequency: Every Two Years*

Strategic Performance Measure 1.2 (New): Percentage of bicycle-related spot maintenance requests addressed in two working days or less. This measure will monitor the responsiveness of bicycle facility maintenance in the City. Currently, SDOT fills potholes reported by cyclists and others within two working days over 95 percent of the time. Between 2007 and 2017, SDOT increase its responsiveness to 99 percent.

- *Data Collection Responsibility: SDOT Maintenance Division*
- *Data Collection and Reporting Frequency: Every Year*

Objective 2: Provide amenities that make bicycle transportation more convenient

Strategic Performance Measure 2.1 (Existing): Number of bicycle racks installed through the SDOT Bicycle Parking Program. This measure will monitor progress towards providing short-term bicycle parking near key destinations throughout Seattle by 2017. It is estimated that 11,000 racks are needed meet the estimated demand for bicycle parking in key areas of the city²⁰. Since there are currently approximately 3,000 bicycle racks in the city, 8,000 will need to be installed between 2007 and 2017. SDOT installed 61 racks in 2005.

- *Data Collection Responsibility: SDOT Pedestrian and Bicycle Program*
- *Data Collection and Reporting Frequency: Every Two Years*

Strategic Performance Measure 2.2 (Recommended for Sound Transit and KC/METRO consideration): Percentage of estimated 2017 bicycle parking demand met by current bicycle racks and lockers at transit stations in Seattle. Sound Transit and KC/METRO should provide SDOT with the number of bicycle parking spaces available at each transit stop and station in Seattle. Bicycle parking demand for 2017 should be estimated using the PSRC Regional BikeStation Project methodology.

- *Data Collection Responsibility: Sound Transit, KC/METRO*
- *Data Collection and Reporting Frequency: Every Two Years*

Strategic Performance Measure 2.3 (Recommended for KC/METRO and Sound Transit consideration): Number of bicycles carried on KC/METRO and Sound Transit buses. KC/METRO should obtain more complete, year-round data on bike-on-bus boardings. For example, KC/METRO should count bicycle-on-bus boardings each month, and provide SDOT with these counts. This

²⁰The estimated need for 11,000 bicycle racks is based on the following assumptions: 1) An average of one bicycle rack is needed per 100 feet of arterial roadway block face in all Urban Village Centers (includes Hub Urban Villages, Urban Centers, and Urban Center Villages)—this average of one rack per 100 feet of arterial roadway block face overestimates the number of bicycle racks by counting arterial roadway sidewalks that may be too narrow to install bicycle racks or may have lower bicycle parking demand, but underestimates the number of bicycle racks by not including racks on adjacent non-arterial streets in commercial districts with higher bicycle parking demand, 2) An average of 10 bicycle racks are needed per public school (includes administration buildings, resource centers, etc., and varies depending on the size and location of the school), 3) An average of 5 bicycle racks are needed per private school (varies depending on the size and location of the school and students living within bicycling distance), 4) An average of 5 bicycle racks are needed per community center (varies depending on the size and location of the community center), 5) An average of 3 bicycle racks are needed per library (varies depending on the size and location of the library). Since approximately 3,000 bicycle racks are already in place, 8,000 racks will need to be installed between 2007 and 2017.

measure would include all routes served by KC/METRO throughout the region, and would not be exclusive to the City of Seattle.

- *Data Collection Responsibility: KC/METRO*
- *Data Collection and Reporting Frequency: Every Year*

Objective 3: Partner with organizations to develop bicycle education, enforcement, and encouragement programs

Strategic Performance Measure 3.1 (Existing): Number of Seattle Bicycling Guide Maps distributed. This measure will monitor progress toward improving bicycle wayfinding and encouraging people to use the City's bicycle facilities. The SDOT Pedestrian and Bicycle Program should continue track the number of bicycle maps that are distributed. This currently includes paper maps, but should include the number of times online maps are accessed in the future. 150,000 Bicycling Guide Maps should be distributed between 2007 and 2017. 23,338 maps were distributed in 2005.

- *Data Collection Responsibility: SDOT Pedestrian and Bicycle Program or its designated representative*
- *Data Collection and Reporting Frequency: Every Year*

Strategic Performance Measure 3.2 (Recommended for Seattle area bicycle advocacy organizations consideration): Number of Seattle residents participating in pedestrian or bicycle safety education programs or events. Seattle area bicycle advocacy organizations should track the number of participants in education or encouragement activities (e.g., Bike to Work Day, bicycle commuter classes, bicycle safety training, bicycle camps, etc.), for inclusion in the Bicycle Benchmarking Report. The number of participants in these bicycle activities should triple between 2007 and 2017.

- *Data Collection Responsibility: Seattle area bicycle advocacy organizations, Volunteer groups*
- *Data Collection and Reporting Frequency: Every Year*

Objective 4: Secure funding and implement bicycle improvements

Strategic Performance Measure 4.1 (New): Percentage of targeted SDOT staff who participate in training on bicycle planning, design, and engineering issues. This measure will help indicate the level of internal training that is provided on bicycle issues. The following types of staff should receive bicycle training: planners, designers, project managers, staff working on projects with signs and paint, staff working on signals, crew chiefs, and field crews. SDOT should take advantage of everyday opportunities to provide these targeted staff with bicycle training. This includes Complete Streets training, Pedestrian and Bicycle Program presentations, field demonstrations of products (e.g., pavement markings, multi-use trail ramps, bollards), ProBike/ProWalk conference sessions, mobile workshops, walking audits, and out-of-town expert presentations. 100 percent of targeted SDOT staff should receive some type of training every year.

- *Data Collection Responsibility: SDOT Pedestrian and Bicycle Program*
- *Data Collection Reporting Frequency: Every Year*

Strategic Performance Measure 4.2 (New): Amount of grant funding applied for and obtained for bicycle programs. The SDOT Policy and Planning Division should continue to track the amount of bicycle project funding that SDOT applies for and obtains through grant sources. This measure has been collected internally in the past.

- *Data Collection Responsibility: SDOT Policy and Planning Division*
- *Data Collection and Reporting Frequency: Every Year*

Strategic Performance Measure 4.3 (Existing): Number of Bicycle Spot Improvements Completed. This measure will track SDOT's responsiveness to public requests for bicycle spot improvements. SDOT completed 49 spot bicycle and pedestrian improvements in 2005 (bicycle and pedestrian improvements were reported together).

- *Data Collection Responsibility: SDOT Pedestrian and Bicycle Program*
- *Data Collection and Reporting Frequency: Every Year*

APPENDIX A: EXISTING CONDITIONS FOR BICYCLING

Introduction

This appendix provides a general overview of bicycling in Seattle today. Its two main sections describe the current conditions in Seattle related to bicycle usage and bicycle safety. Information about bicycle counts, bicycle trip purposes, and bicycle mode shares compared with other cities is presented in the bicycle usage section. The bicycle safety section discusses bicycle crash data, existing bicycle facilities, gaps in the City's bikeway network, and barriers to bicycling.

Information about the existing conditions for bicycling in Seattle provides the basis for the specific improvements recommended in the Plan.

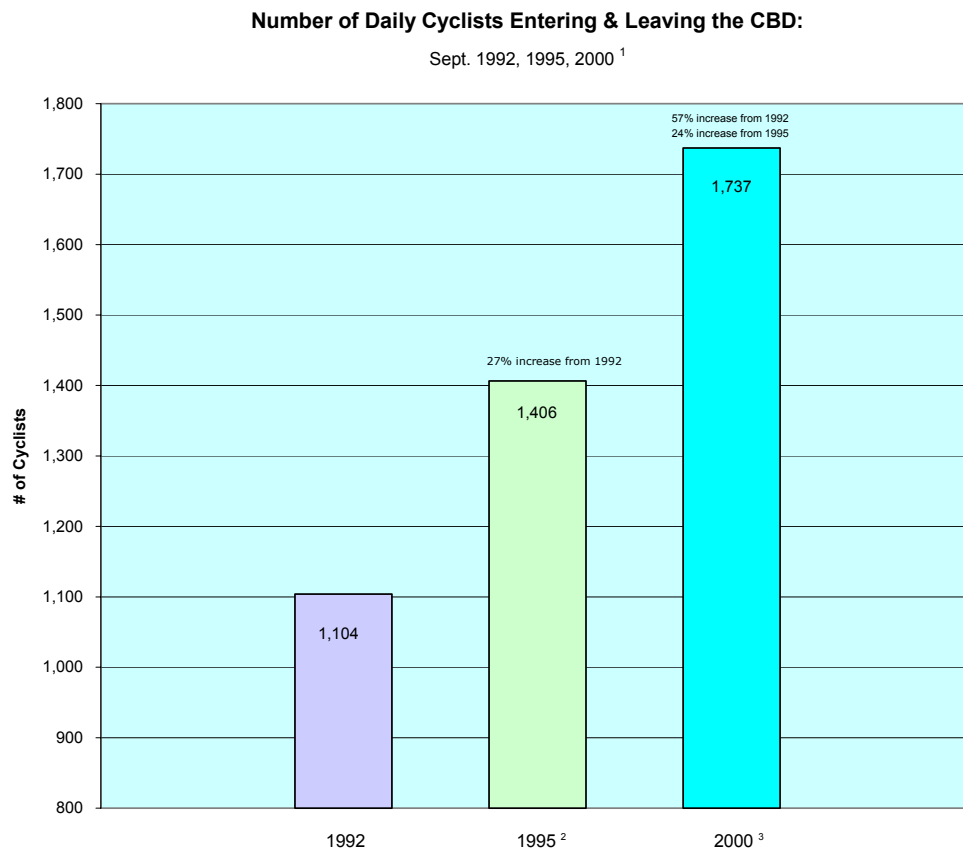
Bicycle Usage

One of the two central goals of the Plan is to increase the amount of bicycling throughout Seattle. While many residents of Seattle already bicycle, there is significant potential to increase the frequency of their bicycle trips. In addition, a portion of Seattle residents who do not currently bicycle can be encouraged to ride.

Bicycle Counts

While there is relatively little data available on the total number bicycle trips throughout the City on any given day, the Seattle Department of Transportation has occasionally conducted counts of bicyclists during the morning peak period (6:30 to 9:00 a.m.). In July 2001, 427 bicyclists were counted on the Burke-Gilman Trail at Stone Way. Over 280 bicyclists were observed during the morning peak at the south end of the Dexter Avenue bicycle lanes in September 2000. Between 1992 and 2000, the total number of bicyclists entering and leaving the Central Business District area morning peak period increased by 57% (see Figure A-1).

Figure A-1. Downtown Bicycle Counts, 1992-2000.



¹ In each year, bicycle counts were performed on a Wednesday morning in late September from 6:30am to 9:00am. In 1992 and 2000, 29 locations covering virtually all access points into and out of downtown Seattle were covered.

² Although reasonable efforts were made to minimize double counting, it is impossible to identify cyclists that crossed the cordon boundary more than once.

³ In 1995, the count focused on 13 of the most important corridors identified in the 1992 study. The 1,406 figure, therefore, is an estimate of the total number of bicyclists.

⁴ For 2000, data does not include counts for the 2nd and Broad Street station between 8:00-8:30am. This probably resulted in undercounting by approximately 10-15 bicyclists.

Citywide data on bicycle commuting to work is provided by the US Census. In 2000, 1.88% of Seattle residents reported bicycling as their primary mode of transportation to and from work¹. Some parts of Seattle have particularly high levels of bicycle commuting. Over five percent of residents commute to work by bicycle in parts of the University District, Wallingford, Fremont, Ballard, and Capitol Hill (see Figure A-2). Census data do not capture trips made for recreational, social, or shopping purposes or trips made by children under age 16, so it undercounts many other bicycle trips being made in all of Seattle's neighborhoods.

While Seattle's overall bicycle commute mode share is significantly higher than the national average (0.47%), it is similar to cities such as San Francisco (1.92%) and Portland (1.76%), [and is far below world cities, such as Amsterdam (over 50%), Beijing (48%), Tokyo (25%), and Copenhagen (20%)²].

¹ The Census long form was used to gather journey to work data in 2000. This form is given to approximately 1 in 6 households. It asks respondents to identify the mode of transportation that they used most often during the previous week. The form is distributed in late March/early April. Therefore, people who bicycled to work only once during the week or only bicycle to work during the summer were not captured.

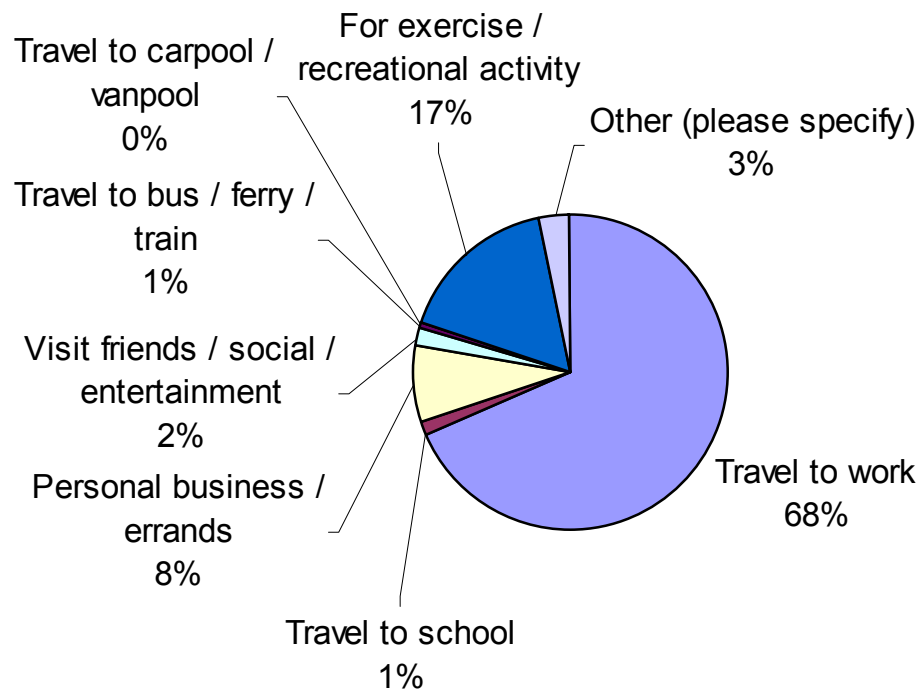
² International Bike Fund.

[illegible]

Bicycle Trip Purposes

Seattle residents bicycle for a variety of transportation purposes. The online Bicycle Master Plan questionnaire asked respondents to report the purpose of their last bicycle trip. 68% of respondents bicycled to or from work, followed by 17% for exercise/recreational activity, and 8% for personal business/errands (see Figure A-3). While this survey was unscientific, it was completed by over 1,500 respondents, showing that many people in Seattle enjoy bicycling for recreation and find bicycling useful for transportation.

Figure A-3. Primary Purpose of Respondent's Last Bicycle Trip
(Source Seattle Bicycle Master Plan Online Questionnaire, August through September 2006)



Bicycle Trip Potential

Seattle, like many other Cities in the United States, has great potential for increasing the amount of bicycling done by residents. Approximately 16% of Seattle households do not own a motor vehicle. Further, 14% of Seattle residents are under age 16³. Therefore, nearly 30% of Seattle residents are not able to drive a motor vehicle.

There are many opportunities to make trips by bicycle in Seattle. According to the National Household Travel Survey, 48 percent of all trips are less than three miles, within comfortable bicycling distance for many people⁴. In Seattle, many activity destinations are distributed in urban village centers and neighborhoods in all parts of the City. This means that most

³ U.S. Census 2000.

⁴ U.S. Department of Transportation, Bureau of Transportation Statistics. *National Household Travel Survey*, 2001.

Seattleites are within bicycling distance of grocery stores, retail centers, work, school, parks, and transit connections.

Bicycle Safety

One of the most critical factors required to realize the full potential for bicycling in Seattle is to ensure that conditions are safe for bicycling. Therefore, improving the safety of bicyclists is also a central goal of this Plan. A safe bicycling environment is essential for making bicycle trips more convenient and for preventing crashes and injuries. It is also critical for making residents who are not experienced bicyclists feel comfortable enough to try bicycling. However, the existing physical conditions for bicycling many areas of the City require improvement.

Bicycle Crashes

Over the four-year period between 2002 and 2005, there were 1,088 police-reported bicycle crashes in the City of Seattle (an average of 272 per year)⁵. Bicycle crashes have occurred in all parts of the City, but tend to be concentrated in areas with higher bicycle use (see Figure A-4). Information about the causes and characteristics of these crashes will help the City make physical improvements and also partner with other organizations to utilize education and enforcement programs to improve the safety of bicyclist and driver behavior.

The police-reported bicycle crashes showed several other trends, including:

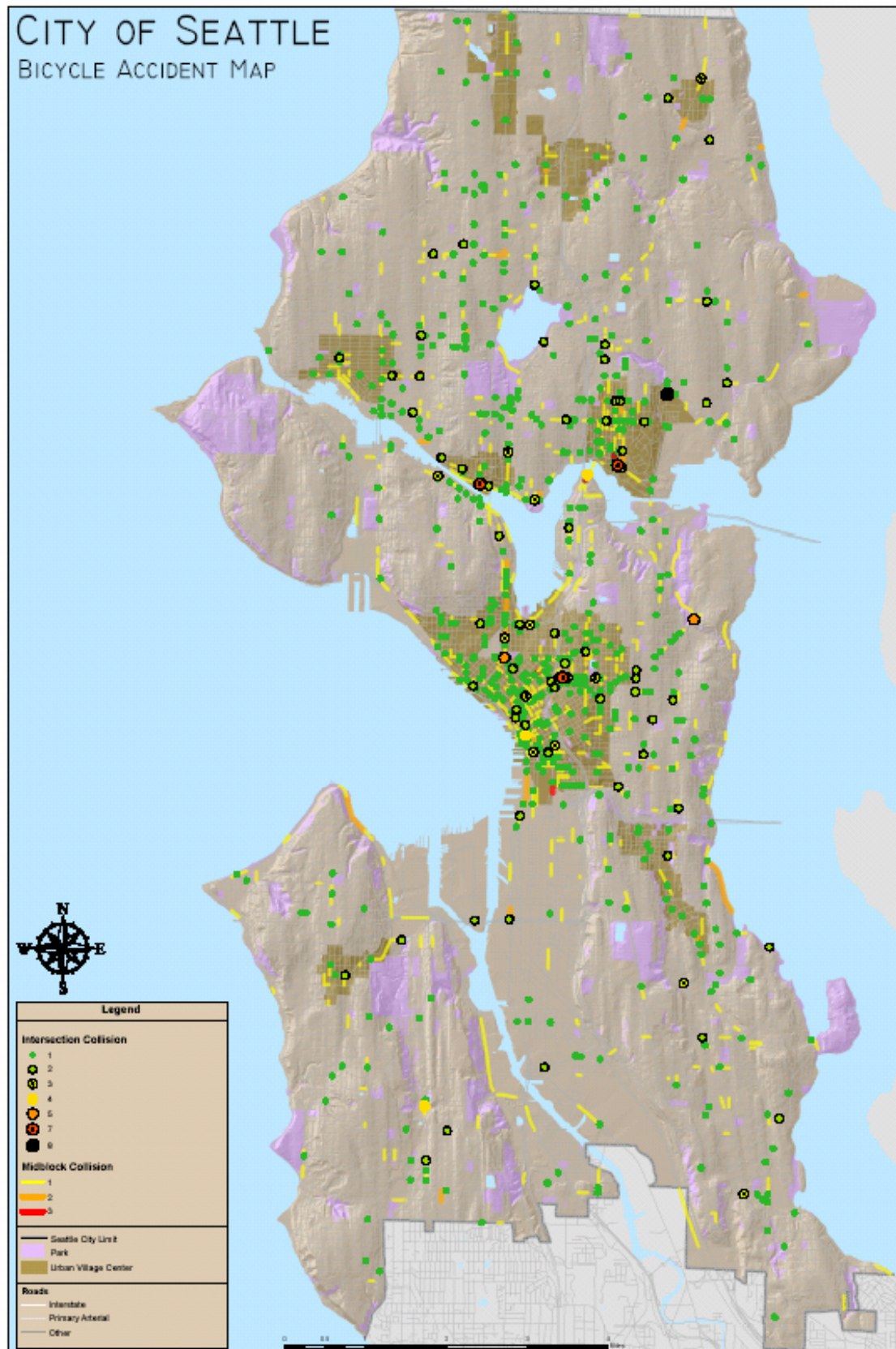
- Crashes were more common on weekdays than on weekends (the average weekday had 70% more bicycle crashes than the average weekend day)
- More crashes occur during the afternoon peak period than other parts of the day—the most common hour for bicycle crashes is between 5:00 p.m. and 6:00 p.m.
- Most (approximately 90%) of the reported bicycle crashes involved an injury to the cyclist. It is also likely that many less severe bicycle crashes were not reported to police.
- There were two bicycle fatalities over the four-year period.
- Approximately 21% of reported bicycle crashes occurred under dark, dawn, or dusk lighting conditions.
- Bicycle crashes peaked during summer months (65% of crashes occurred during the six months from May to October; 35% of crashes occurred during the other six months of the year).

⁵ A study by Stutts and Hunter of a sample of cases collected at eight hospital emergency rooms in three states, showed that only 56 percent of the pedestrians and 48 percent of the bicyclists were successfully linked to cases reported on their respective state motor vehicle crash files. This study looked at only the most serious crashes (involving emergency room treatment). We can assume that less-severe crashes were accurately reported at an even lower rate. Good sources on police-reported bicycle and pedestrian crashes include:

a) Stutts, J.C. and W.W. Hunter. "Police-reporting of Pedestrians and Bicyclists Treated in Hospital Emergency Rooms," Transportation Research Record No 1635, Transportation Research Board, 1998. P. 88-92.

b) Aultman-Hall, L and J. LaMondia. Developing a Methodology to Evaluate the Safety of Shared-Use Paths: Results from Three Corridors in Connecticut, Connecticut Transportation Institute, Connecticut Department of Transportation, Joint Highway Research Advisory Council, JHR 04-297, Project 02-2, May 2004. Available Online: http://www.engr.uconn.edu/ti/Research/jhr04-297_02-2.pdf.

Figure A-4. Police-Reported Bicycle Crashes (2002-2005)



Existing Bicycle Facilities

Since the adoption of Seattle's first Bicycle Master Plan in 1972, the City has developed approximately 39 miles of multi-use trails and 26 miles of striped bicycle lanes (see Table A-1).

Table A-1. Existing Bicycle Facilities

Facility Type	Miles ¹
Bicycle lanes/climbing lanes	25.5
Shared lane pavement markings	0.3
Bicycle boulevards	0.0
Other on-road bicycle facilities ²	2.2
Multi-use trails	39.4
Other off-road bicycle facilities ³	0.2
TOTAL NETWORK	67.6

¹For on-road bicycle facilities, total miles represent roadway centerline miles with bicycle facilities (e.g., bicycle lanes on both sides of the roadway are not counted separately).

²Other on-road bicycle facilities include wide outside lanes, edgelines, paved shoulders, and peak hour bus/bicycle only roadways. Key corridors for short-term study and corridors where an improvement is needed, but the facility is unknown are also counted in this category.

³Other off-road bicycle facilities include sidepaths, one-way bike-on-sidewalk pairs, and pedestrian/bicycle-only bridges.

Major components of the City's existing bicycle system include:

- Multi-Use Trails, such as the Burke-Gilman Trail, Elliott Bay Trail, I-90 Trail, Alki Trail, Duwamish Trail, Interurban Trail, and Chief Sealth Trail
- Bicycle lanes on streets such as NE Ravenna Boulevard, NW Dexter Avenue, NW Fremont Avenue, E Martin Luther King, Jr. Boulevard, Jackson Street, and S Rainier Avenue
- Non-arterial streets throughout the City with low traffic volumes and speeds
- Facilities complementing the existing bikeways include bicycle route signs, bicycle parking racks and lockers, and bicycle racks on buses

While many bicycle lanes, trails, and supporting facilities have been developed, there is not an interconnected network of bicycle facilities throughout the City (see Figure A-5). Some urban villages—the commercial and activity centers of many neighborhoods—are not connected to other parts of the City by bicycle facilities. In addition, there are no existing bicycle facilities within some urban villages to provide access to shopping, restaurant, workplace, and other destinations. There is also a lack of bicycle connectivity between homes and schools, parks, and recreation centers.

Figure A-5. Existing Bicycle Facilities (see next page)

While there is not a complete network of bicycle facilities throughout the City, the SDOT Transportation Strategic Plan (2005) recommends a citywide Urban Trails System (See Figure A-6: Urban Trails and Bikeways System). The Urban Trails System includes a spine network of existing and proposed high-quality bicycle facilities, many of which are on separated rights-of-way from motorized traffic. This Bicycle Master Plan recommends changing the name of the Urban Trails System to the Urban Trails and Bikeways System.

Figure A-6. Urban Trails and Bikeways System (source: Transportation Strategic Plan)

Non-Arterial Roadways

The most common types of bicycle facilities available in Seattle are non-arterial roadways. Many non-arterial roadways are neighborhood streets with low traffic volumes and low traffic speeds, making them comfortable places to bicycle. However, non-arterial roadways are often difficult to use as routes because many run into dead ends, go up very steep hills, or cross major arterial roadways at difficult intersections. Bicycling outside of a small neighborhood area almost always requires using parts of arterial roadways. In a few areas of the City, there are non-arterial routes that can be used to access important destinations. Yet, the optimal route to use given topography and traffic may require many turns, making it difficult to follow because few of these routes are designated by bicycle route signs or markings.

Multi-Use Trails

Seattle has approximately 40 miles of multi-use trails, which are utilized by many bicyclists. These trails are provided only in some parts of the City, and the existing built environment of the City presents limited opportunities to develop new trail corridors. In addition, parts of the trail existing system are very difficult to access because there are no connector paths between nearby neighborhood streets and the main trail. There are also several other challenges to bicycling on the existing trail system:

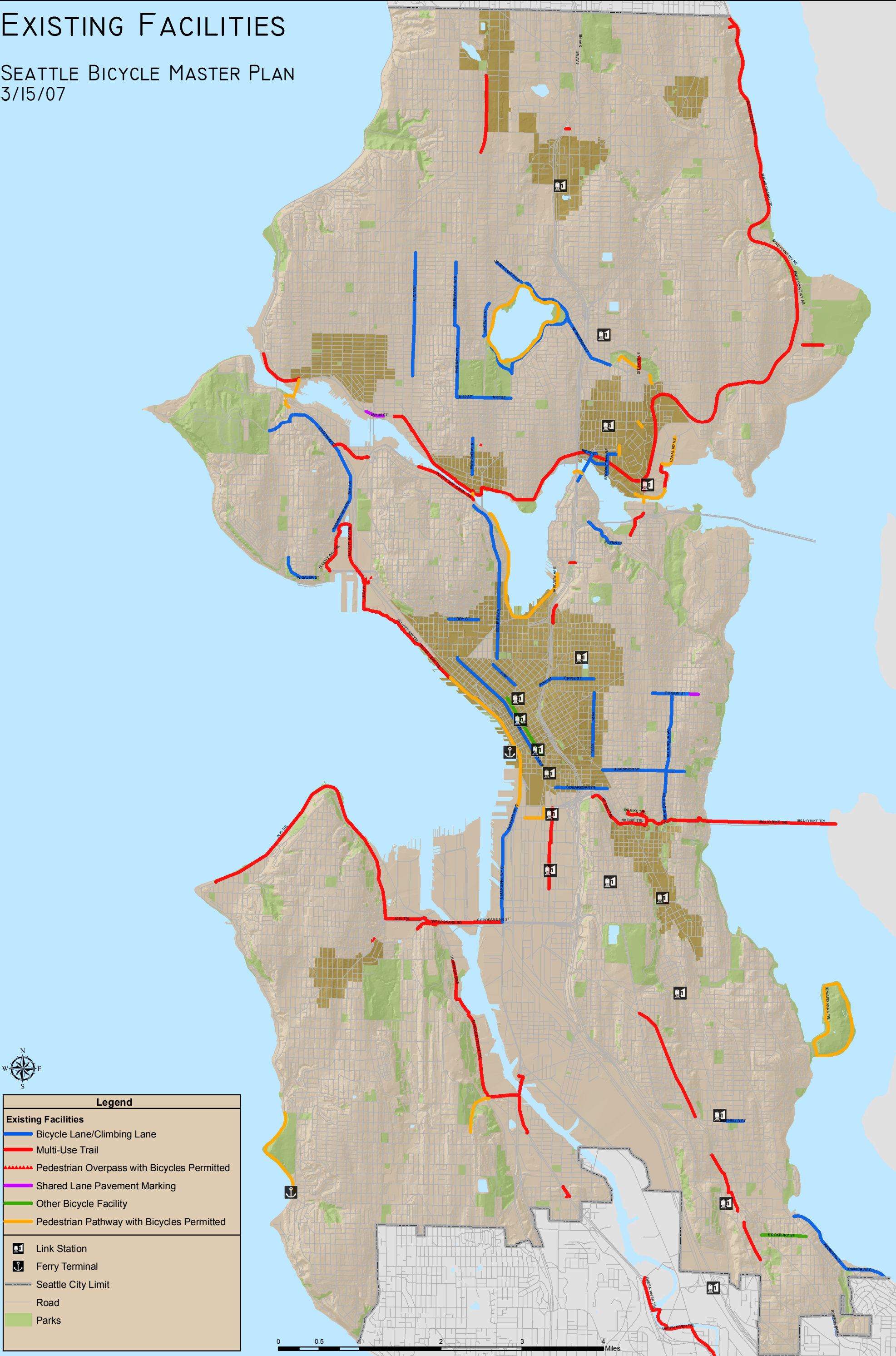
- Difficult arterial roadway crossings (e.g., Burke-Gilman Trail at 25th Avenue NE, I-90 Trail at 23rd Avenue S and Martin Luther King Jr. Way S, etc.).
- Poor pavement quality, overgrown brush, and other maintenance problems (particularly on older sections of the Burke-Gilman, Alki, and Duwamish Trails).
- Overcrowding and pedestrian crossings on popular sections of trail (e.g., Burke-Gilman Trail near the University of Washington).
- Critical gaps in several trail systems (e.g., Burke-Gilman Trail through Ballard and parallel to Seaview Avenue; I-90 Trail between I-5 and Downtown; Duwamish Trail between W Marginal Way and the Low Level Bridge; and Chief Sealth Trail between S Myrtle and S Kenyon and from Renton Avenue S into Renton)

Arterial Roadways

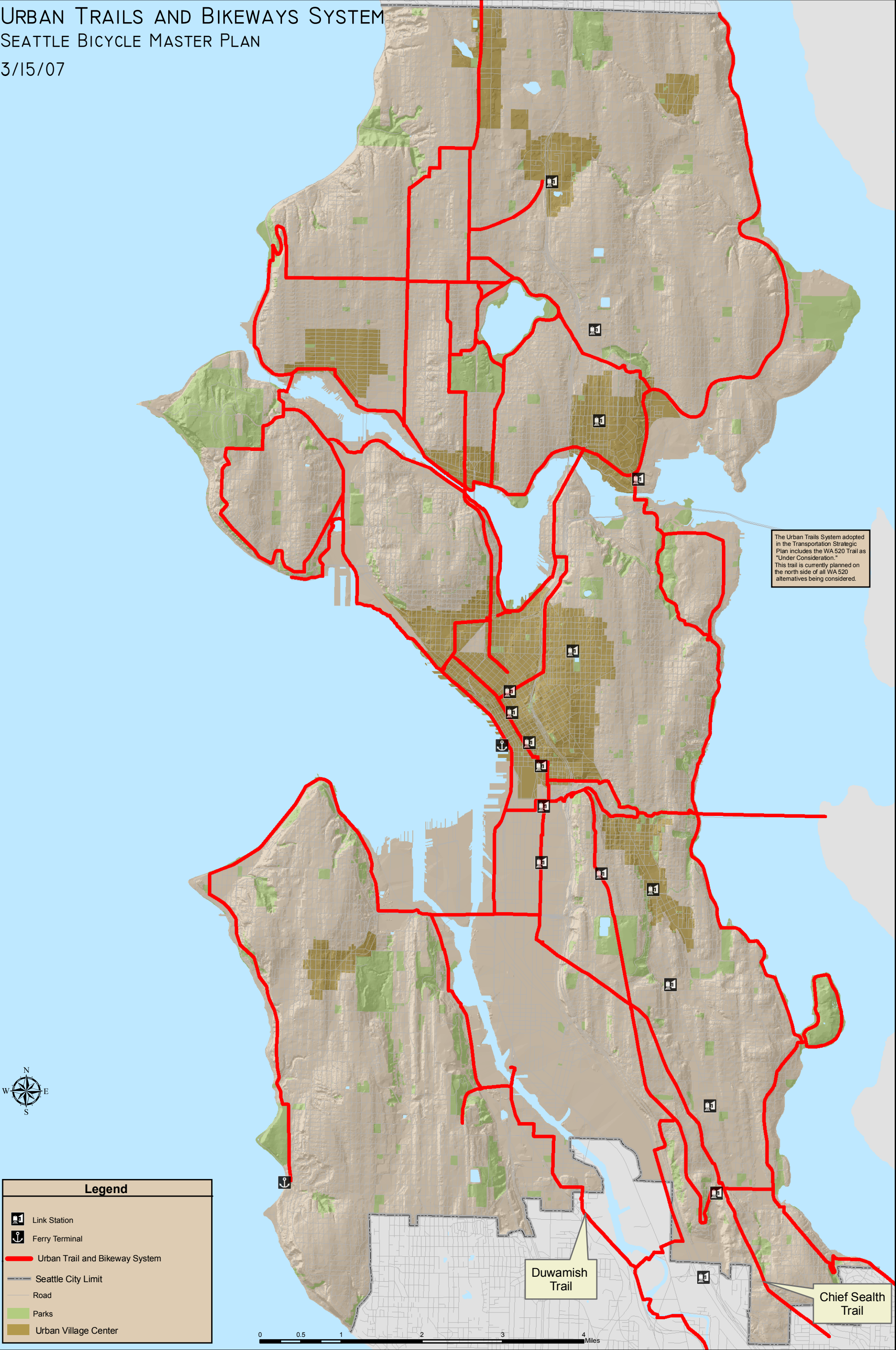
There are currently several types of bicycle facilities provided on Seattle's arterial roadways. Bicycle lanes are the most common type, marked on 25 miles of streets. Most of the existing bicycle lanes are on the right side of the travel lanes, with the exception of 2nd Avenue Downtown and NE Ravenna Boulevard. There are also several miles arterial roadways with paved shoulders, wide outside lanes, and shared lane pavement markings. 3rd Avenue Downtown is closed to all vehicles except buses and bicycles during peak hours.

EXISTING FACILITIES

SEATTLE BICYCLE MASTER PLAN
3/15/07



URBAN TRAILS AND BIKEWAYS SYSTEM
SEATTLE BICYCLE MASTER PLAN
3/15/07



Seattle's arterial roadways are critical for bicycle access. The arterial streets are public rights-of-way that typically provide continuous connections between neighborhoods and key destinations to all parts of Seattle. They are often the most direct and least hilly routes that are available for many trips. However, arterial streets often carry higher-volume, higher-speed traffic than other non-arterial streets. Because many of these busy arterial streets do not currently have bicycle lanes or other on-street bicycle facilities [to provide designated space for bicyclists and/or a visible indication that bicyclists should be expected on the roadway], they can be uncomfortable to ride on or avoided by bicyclists completely. In a few cases, there are nearby multi-use trail or non-arterial street routes that can be used as alternatives to a busy arterial street. However, even if these non-arterial roadway facilities are nearby, they may have difficult roadway crossings for bicyclists to negotiate, and bicyclists often still need to access destinations that are on the arterial roadway.

Roadway Crossings

Roadways like Aurora Avenue N, 35th Avenue SW, and Rainier Avenue S are multi-lane roadways that can be very difficult for bicyclists to cross. Full traffic signals, pedestrian crossing signals, median crossing islands, and bicycle and pedestrian overpasses/underpasses are all facilities that help bicyclists, as well as other users, cross these roadways. Even with traffic controls, some intersections are still difficult for bicyclists to negotiate because of turning vehicles (e.g. Burke-Gilman Trail at 25th Avenue NE; downtown street crossings of the 2nd Avenue bicycle lanes). As the citywide network of bicycle facilities is developed, it is critical to have safe and convenient crossings of streets with high traffic volumes and high traffic speeds.

Bridge Crossings

Other existing barriers to bicycling include bridge crossings:

- Bridges across the Ship Canal, including the approaches to each bridge (e.g., Ballard Bridge, University Bridge, Aurora Bridge, etc.)
- Bridges and underpasses across I-5 (e.g., N 92nd Street, NE 50th Street, NE 45th Street, S Jackson Street, S Dearborn Street, S Holgate Street, S Lucile Street)
- Bridges over railroad tracks (e.g., 1st Avenue S, 4th Avenue S, Airport Way S)
- Bridges across the Duwamish River, including the approaches to each bridge (Low Level Bridge, 1st Avenue S Bridge, 14th Avenue/16th Avenue S Bridge)

These bridges, including their approaches and access ramps are critical for long-term improvements to bicycle access throughout the City.

Signed Bicycle Routes

Several signed bicycle routes were established by the City in the 1980s. Routes such as the Magnolia Loop and Ballard Route were designated by bicycle route signs. Signs on many of these routes have not been maintained in recent years, and this Plan recommends replacing these existing signs with new bicycle route signs and a citywide wayfinding concept.

Supporting Bicycle Facilities

Seattle also has supporting bicycle facilities, such as bicycle racks, bicycle lockers, and bicycle racks on buses. Racks are located in many office buildings, commercial areas, and near colleges and universities. Some have been added at transit stations, in parks, and along trails. The City has one staffed bicycle facility—BikeStation Seattle®. This facility provides secure bicycle parking, bicycle repair, and bike rentals.

Bicycle Facility Issues by Location

The section below summarizes some of the most critical bicycle facility issues in each part of the City. These critical bicycle facility issues are based on field evaluations from several groups⁶, consultant team field work, and public comments provided through the online questionnaire and the Bicycle Master Plan public meeting (a more detailed summary of the public comments is provided at the end of this Appendix).

Downtown Seattle/South Lake Union

- Installation of bike lanes on Alaskan Way between the Elliott Bay Trail and East Marginal Way
- Improving the existing bicycle lanes on Alaskan Way/East Marginal Way S
- Improving bicycle access between Downtown and the stadium areas and light rail stations to the south
- Crossings of Denny Way, particularly access from Dexter Avenue N bicycle lanes to Downtown
- Access between Downtown and the University of Washington via Eastlake Avenue E, Fairview Avenue N, Virginia Street, Stewart Street, and Howell Street as well as via Melrose Avenue E, Lakeview Boulevard E, and Harvard Avenue E
- Providing a north-south bicycle facility through Downtown
- Improving east-west access on Bell Street/Blanchard Street, Pine Street/Pike Street, Spring Street/Seneca Street
- Conflicts with turning vehicles, particularly with the 2nd Avenue left-side bicycle lane
- Conflicts with buses
- Improving north-south access through South Lake Union on Westlake Avenue
- Developing connected bicycle facilities on all sides of Lake Union

Capitol Hill/First Hill/International District

- I-5 crossings into Downtown (Denny Way, Olive Way, Pine Street, Pike Street, Spring Street, Seneca Street, Yesler Way, Jackson Street, Dearborn Street)
- Connection to University of Washington via Harvard Street (Melrose/Lakeview should be discussed as a bigger “idea” - see separate comments on the potential for this route)
- Improvements to Broadway
- Improvements to the Arboretum Bypass route
- Crossings of Boren Avenue
- Improving the existing Martin Luther King, Jr. Way bicycle lanes
- Identifying and improving east-west routes
- Improving the condition of Lake Washington Boulevard

Magnolia/Queen Anne

- Improving the Dexter Avenue N Bike Lanes
- Improving the condition of the Elliott Bay Trail
- Providing better bicycle access on the Magnolia Bridge
- Providing bicycle access in the Elliott Avenue Corridor from the Ballard Bridge to Downtown

⁶ Cascade Bicycle Club. *Left by the Side of the Road: Puget Sound Regional Bicycle Network Study: Assessment and Recommendations*, 2003; Seattle Bicycle Advisory Board Bikeability Reports, 2006.

- Improving access to Upper Queen Anne
- Providing a trail section to complete the connection between 32nd Avenue W, W Galer Street, and W Marina Place
- Providing east-west access through Lower Queen Anne on N Roy Street and N Mercer Street
- Providing east-west access on Dravus Street

West Seattle

- Connection to Low Level Bridge via Delridge Way SW
- Bicycle lanes on Delridge Way SW
- Bicycle access on 35th Avenue SW
- Crossings of 35th Avenue SW
- Improvements to Alki Trail
- Improvements to Beach Drive SW
- Improved access to the Fauntleroy Ferry to Vashion Island and Southworth
- Bicycle connections through the West Seattle Greenbelt
- Signage and wayfinding to and across Low Level Bridge
- Identifying and improving east-west routes

South Park/Georgetown

- Improving bicycle access from Downtown to Georgetown via Airport Way S and 6th Avenue S
- Improving bicycle access from Downtown to South Park via 1st Avenue S, E Marginal Way S, and W Marginal Way S
- Improving bicycle access across the Duwamish River between Georgetown and South Park via the 14th/16th Avenue S Bridge and 1st Avenue S Bridge
- Improving bicycle access up the hill from South Park to West Seattle

Southeast Seattle

- Completing the Chief Sealth Trail
- Extending the Chief Sealth Trail north across I-5 to Downtown
- I-5/I-90 crossings (S Albro Place, S Lucille Street, S Holgate Street, Columbian Way, and 12th Avenue S)
- Improving the condition of Lake Washington Boulevard S
- Bicycle access on Rainier Avenue S
- Crossings of Rainier Avenue S
- Bicycle access and wayfinding to new Sound Transit Stations
- Development of a new multi-use trail in the I-5 corridor
- Completion of the Mountains to Sound Greenway, including the multi-use trail connection across the I-5 & I-90 interchange
- Constructing a new crossing over the railroad tracks at Military Road
- Identifying and improving east-west routes

Ballard/Fremont

- Completing the Burke-Gilman Trail to Golden Gardens Park
- Improving bicycle access to and across the Ballard Bridge
- Improving bicycle access to and across the Fremont Bridge
- Identifying and improving east-west routes between Ballard and Fremont

- Improving condition of bicycle crossing and removing restrictions to crossing the Locks
- Crossings of 15th Avenue NW and Aurora Avenue N

Wallingford/University District/Ravenna

- I-5 crossings between Wallingford and the University District (NE 45th Street, NE 50th Street, NE Ravenna Boulevard, NE 65th Street, NE 70th Street, NE 80th Street)
- Providing a new pedestrian/bicycle crossing of I-5 between NE 45th Street and NE 50th Street
- North/south bicycle access on Roosevelt Way NE/11th Avenue NE
- Improving bicycle access to and across the University Bridge (particularly crossing the exit ramps on the north side of the bridge)
- Improving bicycle access to and across the Montlake Bridge (particularly crossing roadways on both ends of the bridge)
- Reducing bicycle and pedestrian conflicts and roadway crossing conflicts on the Burke-Gilman Trail (particularly at 25th Avenue NE, and at NE Pacific Street/UW Medical Center Parking Lot)
- Improving access between the Burke-Gilman Trail and Green Lake via NE Ravenna Boulevard (particularly improving access on the southeast end of this linkage)
- Bicycle access on Stone Way
- Improving crossings of NE 45th/46th Street and NE 50th Street

Northwest Seattle

- Completing the Interurban Trail north into Shoreline
- Providing a bicycle boulevard from southern terminus of the Interurban Trail to Green Lake Area
- Identifying and improving east-west routes
- Access to Golden Gardens park from northwest Seattle neighborhoods
- Crossings of Greenwood Avenue N and Aurora Avenue N

Northeast Seattle

- Access to Burke-Gilman Trail from northeast Seattle neighborhoods
- Burke-Gilman Trail maintenance improvements
- Identifying and improving east-west routes between Ballard and Fremont
- Crossings of I-5 (N 130th Street, N 117th Street, N 92nd Street)
- Crossings of Lake City Way NE, NE Northgate Way, and NE 125th/130th Avenue

Public Comment Summary

Public comments were provided through a variety of sources during the planning process. This appendix summarizes the comments provided during the August 29, 2006 public meeting and from the online survey that was posted between August and September 2006.

Public Meeting Comments

The sections below summarize the comments written on the maps during the City of Seattle Bicycle Master Plan Public Meeting on August 29, 2006. At the meeting, citizens were given the opportunity to provide comments in a variety of ways, including talking with members of the project team, writing on comment cards, completing an online survey (using an on-site computer), and marking on a number of maps. The maps available for comment included:

- Citywide Preliminary Bicycle Facility Recommendations
- North Seattle Preliminary Bicycle Facility Recommendations
- South Seattle Preliminary Bicycle Facility Recommendations
- Downtown Seattle Bicycle Facilities
- Seattle Bicycle Map
- Large-Scale, Site-Specific Maps:
 - I-5 crossings between NE 40th Street and NE 50th Street
 - Green Lake
 - University Bridge
 - Connection to new Sound Transit Station at Rainier Avenue, Martin Luther King Jr. Way, and McClellan Street
 - Rainier Avenue Crossing at S Dearborn Street
 - Ballard Bridge
 - Fauntleroy Way
 - I-5 crossing at S Lucille Street (and access through the surrounding areas)

This document describes the comments marked on the maps. While each comment is not listed verbatim, the sections below represent the main issues raised by the public. General topics are listed first, followed by sections of location-specific comments categorized by geographic area.

General

1. Enforce no parking or standing in bicycle lanes.
2. Enforce leash laws on bicycle routes through park areas.
3. Connect neighborhoods directly by improving bicycle facilities on the roadway network rather than relying only on multi-use trail connections.
4. “Do more trails like the Burke-Gilman. That will make us the #1 bicycling city. If we can build new roads, we can build new trails!”
5. When a traffic signal is provided for a trail, it should provide green/walk for the trail during every cycle (there are examples of signals that do not do this in Ballard).
6. For more specific problems, look at www.bicyclewatchdog.org.
7. Many comments were written about glass and debris on streets, bridges, trails, and in bike lanes. Residents want to have all bicycle facilities, streets, and bridges swept more regularly. Specific locations mentioned:
 - a. Lander Street near 49th Ave SW (West Seattle)

- b. Seward Park Avenue from Cloverdale to Rainier
 - c. Rainier Avenue - Seattle portion bike lanes are much less well maintained than the Renton portion.
 - d. Alaskan Way bike lanes north of Spokane.
 - e. Overlook above I-90 Trail and trail portal near Lake Washington Boulevard
 - f. 10th Avenue, E between Prospect Street and Roanoke Street
 - g. Delmar Drive and other roads in wooded areas—covered with slick leaves in the fall, which makes them hazardous.
 - h. 21st Avenue, W and Thorndyke Avenue, W has gravel at the corner on the roadway.
 - i. Shelby Street and Hamlin Street need to be repaved (near Montlake Bridge)
 - j. Lake City Way
 - k. 45th Avenue and 50th Avenue under Aurora Avenue and on the bridges across I-5 (glass is always in these locations)
8. The City should require glass and debris to be cleaned up at accident sites.
 9. Provide ramps beside stairs so that bicyclists can push their bicycles up steep hills with stairs.
 10. Intersections that are known to have conflicts between bicyclists and motor vehicles should have signals specifically for bicyclists.
 11. Several locations were mentioned where signals do not detect bikes:
 - a. Dearborn at Rainier
 - b. Beacon at Spokane
 12. Several locations were mentioned where pavement needs to be fixed.
 - a. Colman Park Road
 - b. Lake Washington Boulevard (Frink Park and Colman Park)
 13. The bicycle design guide should address the issue of bollards at trail access points because of safety problem they cause. Meeting participants suggested using rubber instead of unforgiving metal.
 14. Plan should address the transition from designated bicycle lanes to sharing travel lanes with motorists (Beacon Avenue Trail, Duwamish River Trail were highlighted as examples).
 15. Bicyclists should be able to ride free on transit.
 16. KC/METRO buses should have racks for more than 2 bicycles (there are now 3-bike racks available commercially).
 17. The City should spend significant amounts of money to improve bridge access (including ramp crossings).
 18. Bicycle sensors should be provided in turn lanes.
 19. Provide lighting on all trails at night.
 20. I-5 crossings should be improved.
 21. Need to improve connection and provide signed route to be able to ride from North Seattle to West Seattle safely.
 22. Many comments provided in support of climbing lanes and sharrows (big bicycle symbol with chevrons rather than “bike in house”).
 23. Some comments asked what a sharrow marking is—hoping that it would be on both directions of the roadway and be effective at indicating the presence of bicyclists to drivers. Some felt that the sharrow markings would not be bold enough for drivers to care about them.
 24. Need wayfinding signs for crossings of I-5, Duwamish River, and Railroads.
 25. Provide connections from Seattle to adjacent jurisdictions.

26. Resources should be made available to help people who are new to bicycling learn how to ride around Seattle—some of the experienced riders can be extremely rude and make new bicyclists feel uncomfortable.
27. Provide BMX or mountain bike parks for youth to practice riding.
28. Plan should show the park boulevard routes that provide pleasant bicycle routes. Cars need to understand that bikes have priority [on these roadways].
29. Some of the most dangerous locations in the City are on the Burke-Gilman Trail in areas with many bicyclists and pedestrians—also need good ways to alert drivers of two-way bicycle traffic.
30. This is the “most positive community meeting I’ve been to in years.”
31. Make a bicycle map for families showing routes for kids.
32. Passengers from cruise ships should be encouraged to rent bicycles.
33. Burke-Gilman Trail needs more signs about cyclist rules - 15 mph speed limits, max 2 abreast, no pace lines, use a BELL, and signs reminding us it’s a Multi-use trail.
34. From a sight-impaired pedestrian: bicyclists should yield the right-of-way to pedestrians—“Please use voice or bell when passing pedestrians.”
35. Provide bike lanes to invite bicyclists off of sidewalks; keep wide sidewalks clear of clutter.
36. There should be bike lanes for children near schools and for the elderly near hospitals and doctors offices.
37. Gaps between pavement slabs are dangerous for bicycles, particularly skinny tires—these gaps should be filled/improved, or at least marked.
38. Use color coded lines on the pavement to designate bicycle routes—use them in conjunction with neighborhood maps.
39. Why is the growth in car ownership an accepted and foregone conclusion, but the same is not assumed for bicycle ridership?
40. “Improve bike infrastructure, such as air stations, ride up windows for espresso, etc. to improve the ridership. Connect the suburbs with bus routes to bike routes.”
41. Add a toll for single-occupant vehicles and a free ride for shared/bus/bikes to SR 520.
42. It seems like a lot of the focus of the Plan is to put lanes on arterials. What are ways to get bikes off arterials?
43. “I like arterial roads because they are most direct. Small roads have a lot of intersections and the road quality is terrible.”
44. Most bike maps use red colors to indicate dangerous areas for bicycling; the Seattle Bicycle Map uses red for trails. The colors on the Seattle Bicycle Map should be changed to conform with this convention.
45. Provide traffic signals with bicycle signal heads at complex intersections.
46. Provide warning signs on roadways that tell drivers that they must have at least 3 feet of separation between themselves and the bicyclist to pass safely.
47. Create trail-oriented commercial businesses at certain locations along City’s trail system (e.g., Burke-Gilman Trail near 3rd Avenue NW, Burke-Gilman Trail near 25th Avenue NE).

Downtown Seattle (includes South Lake Union)

Comments

1. 3rd Avenue should be restricted to Bus/Bike use at all times, not just during peak commuting hours.
2. Add signage to public elevator near Pike & Alaskan Way/1st Avenue.

3. The trail on the east side of Alaskan Way is not bikeable because intersections are difficult, there are too many pedestrians, and it is too narrow.
4. Need a trail along entire length of waterfront to Connect Elliott Bay Trail and Alki Trail (and connect to I-90 Trail).
5. The left-side bicycle lane on 2nd Avenue is dangerous (many people made this comment).
6. Want a dedicated bicycle lane on 2nd and 4th Avenues during Viaduct construction, not just a sharrow.
7. Provide bus/bike lanes on 2nd and 4th Avenues.
8. Remove debris and improve maintenance on Alaskan Way south of Downtown.
9. Provide bicycle facilities to connect 4th Avenue to Airport Way
10. Have you considered a bike lane down the center of the street on 2nd Avenue? The shoulder area is very dangerous with left and right turns.
11. Many people bicycle on Eastlake now, but do not like it.
12. Howell is a very scary roadway for riding from Eastlake to Downtown.
13. No good way to get from Fairview to 9th or Dexter.
14. Connect Eastlake and Fairview to Dexter.
15. Republican and Harrison should be made into good bicycle connections across South Lake Union.
16. Loop trail is requested from Capitol Hill to Dexter Avenue.
17. Provide a trail all the way around Lake Union (on both sides of the lake).
18. Need a good north/south route on the west side of Lake Union.
19. Add a floating dock bicycle trail to the gap in Fairview Avenue between Roanoke and Hamlin Street to make the bicycle route/trail on the east side of Lake Union a feasible alternative.
20. There should be either bicycle lanes or sharrows on Mercer.
21. Provide better connection between the Seattle Center and Lake Union.
22. Improve railroad crossings throughout South Lake Union.
23. Bicycle lanes should be provided on Pike rather than Pine.
24. A full bike path should be provided on the east side of Lake Union from Fairview to Yale Avenue.
25. Westlake Avenue should be improved so that it is more suitable for bicycling.
26. "People are commuting to work and shopping...yet KC/METRO prohibits bicycles from mounting or dismounting buses Downtown, where the steepest grades exist."
27. Allow bicyclists to bring their bicycles on buses in the Downtown area.
28. More bicycle parking should be provided in the International District, near the Convention Center, and near Pioneer Square.
29. High-capacity and covered/protected bicycle parking should be provided by the City in Downtown Seattle.
30. King Street should be made into a bicycle boulevard.
31. Bicyclists have to fight with cruise ship traffic on downtown roadways.
32. Make some type of improvements to Howell Street because it is critical to the connection between Downtown and the U-District.
33. Repave Eastlake Avenue to remove bumps in lane.
34. Open up WSDOT gravel road south of Galer and Colonnade Park to bicycles—it is a safe and viewful alternative to Eastlake Avenue with less altitude loss and gain.
35. Repave Valley Street.
36. Improve signal coordination on Westlake Avenue so that traffic signals work well for bicyclists.
37. Improve connections from Downtown to South Queen Anne

38. There must be a dedicated bike lane northbound through Downtown Core; not a sharrows.
39. Create several bicycle and pedestrian only corridors in Downtown area.
40. Need access to Western Avenue via Virginia or Stewart to allow bicyclists from Pine Street to get to the waterfront.
41. Alaskan Way on game/event days is impossible to use on a bicycle—should provide special accommodations at those times.
42. Turning traffic along Alaskan Way in the Downtown area is hazardous for bicyclists.
43. Use sharrows on Fairview where it is not possible to provide bicycle lanes.

Locations Suggested for Bicycle Lanes

1. 7th Avenue
2. Pike
3. Pine (extend existing bike lane to waterfront)
4. Uphill bike lanes on Pike and Pine
5. 4th Avenue
6. 1st Avenue
7. Taylor
8. West end of Mercer (or sharrows)
9. Fairview
10. Westlake Avenue (entire length) (one comment recommended providing a full, protected 8-foot bike lane on both sides of this roadway)
11. Eastlake Avenue
12. Battery
13. Bell
14. Mercer Street
15. Broad Street
16. Alaskan Way (Belltown area)
17. Valley Street
18. Madison
19. Denny Way
20. Howell
21. Olive
22. Provide northbound bike lane on 3rd, 4th, or 5th Avenue between the I-90 Trail and Downtown.

Locations Suggested for Crossing Improvements

1. Alaskan Way to Elliott Bay Trail
2. 5th Avenue & Airport Way
3. Mercer & Fairview (roundabout and/or better crossings needed)
4. Dexter & Mercer
5. Melrose & Pike
6. Battery & 3rd Avenue (improve the signal timing so that it is in sequence with the other traffic lights in the corridor)
7. Pier 70 Cruise Ship Area
8. Train track crossing at Fairview/Valley
9. Dexter & Denny (install bike detector to give signal advantage to bicyclists)
10. Broad & Roy
11. Denny & Stewart
12. Eastlake & Fairview

13. Fairview & Denny
14. Fairview & Valley (conflicts with existing railroad tracks and proposed light-rail)
15. WA 99 freeway access ramps at 1st Avenue

Locations Suggested for Wayfinding Improvements

1. Eastlake to Stewart
2. U-District to Downtown/Seattle Center (connecting through South Lake Union)
3. Bell Street between Western and 1st Avenue (westbound)
4. Bike route from Dexter to Seattle Center
5. 6th Street bike lanes to 7th/Dexter bike lanes
6. Dexter to Alaskan Way via Blanchard/Bell (including crossing of Denny from Dexter Avenue bike lanes)
7. Dexter to Lower Queen Anne
8. To help bicyclists getting off of ferries in Downtown area
9. Lakeview to Boylston to Harvard (alternative to Eastlake)
10. Through and around Stadiums

West Seattle (includes South Park)

Comments

1. Complete Duwamish River Trail along WA 99 from Holden Street to South, connecting with trail in King County (Define the Duwamish Trail in South Park).
2. Complete connection between Duwamish River Trail and Alki Trail
3. Improve Delridge Way between Andover Street and the west end of the Low Level Bridge Trail.
4. Improve signage and maintenance on Duwamish River Trail.
5. Provide bicycle trail through Lincoln Park.
6. Mark routes from Alki beach to nearby shopping districts and parks for visitors and residents of other parts of the City.
7. Want bike lanes over the high bridge on Spokane because the lower bridge opens for 20 to 30 minutes at a time.
8. Run the Elliott Bay Water Taxi all year round.
9. The road diet on 35th Avenue, SW is a must.
10. Provide a new trail connection between Highland Park Way and South Seattle Community College.
11. Delridge Way is ideal for bicycle lanes or climbing lanes.
12. Delridge Way to Barton Street is an ideal bicycle connection to Fauntleroy, Lincoln Park, and Southwest Seattle.
13. Highland Park Way to Henderson Street is an important bicycle connection.
14. Connecting the complete circuit around West Seattle is critical for bicycle transportation and recreation. Beach Drive is one of the best family bike routes because it is relatively flat and connects to Alki.
 - a. Provide bike lanes on Harbor Avenue, Alki Avenue, Beach Drive.
 - b. Repave Beach Drive.
15. Create a multi-use trail or mountain bike trail in the Greenbelt (from Low Level Bridge area on north end to Westcrest Park on south end).
16. Entire area near the north end of Delridge Way is dangerous for bicycles.
17. West Seattle needs bicycle and pedestrian improvements for Safe Routes to School.
18. Increase water taxi service
19. Provide a floating bicycle bridge between Alki point and Belltown.

20. Provide connections to White Center from Southwest Seattle.
21. Do not provide a bicycle lane on Admiral Way because parked cars are dangerous.
22. Delridge Way to Genessee Street to 35th Avenue SW to Alaska Street is a good connection, but needs road work.

Locations Suggested for Bicycle Lanes

1. Delridge Way
2. 35th Avenue, SW (Do road diet between Hudson Street and Roxbury Street)
3. California Avenue
4. Avalon Way

Locations Suggested for Crossing Improvements

1. The traffic signal at the corner of Southwest Spokane Street/Chelan Avenue, and Delridge Way should be retimed for better bicycle access.
2. Admiral/Avalon/30th Ave., SW intersection

Locations Suggested for Wayfinding Improvements

1. Provide better wayfinding signs to show bicyclists how to get to and get across the Low Level Bridge and connect to the Alki Trail and to Delridge Way.
2. Need signs that show how to get onto the bridge at SW Michigan Street (Duwamish Trail issue).
3. Provide better wayfinding to and from water Taxi.
4. Need neighborhood signs to direct bicyclists from Bridge over Duwamish Waterway into Georgetown, etc. (SW Michigan Street; W Marginal Way)
5. Need signs to show preferred bicycle route in the 21st Avenue, SW/Dawson/22nd Avenue, SW area
6. Need signs for getting back and forth between the Spokane Street bridge and the Duwamish trail.
7. Many bicyclists use Dallas Avenue in South Park—nice, tree-lined roadway. Needs markings and signage.

Southeast Seattle (East of Duwamish River, South of I-90)

Comments

1. “Time to put \$ where mouth is on race/social justice priorities and make near-term commitments to these trails [bicycle facilities] along with big public education push in diverse Rainier Valley Communities.”
2. Provide underpass connection under I-5 between 10th Avenue, S and Industrial Way
3. Open the access road at Beacon Hill Reservoir to connect the south section of 16th Avenue with the north section of 16th Avenue, and make 16th Avenue a bicycle boulevard alternative to 15th Avenue.
4. Sharrows or other bicycle facility should be provided on Graham.
5. Sharrows should be provided on Corson.
6. 38th Avenue, S/Hunter Boulevard S is scary and narrow—cars parked on both sides, opening doors.
7. 38th Avenue, S/Hunter Boulevard S is awesome. It is wide and has few cars. It is a good route for sharrows.
8. I-90 trail crossing of MLK - Install notice of bikes coming so that cyclist doesn’t stop - someone else said: Or at least reduce 1-plus minute wait.

9. Spokane Street is a mess and should be improved to provide connection from Low Level Bridge to new 5th Avenue Trolley Trail. This includes improving crossings of the railroad tracks between East Marginal Way and 1st Avenue.
10. Construct a trail in the I-5 corridor between Lucile Street and I-90 trail
11. Comment to “open access road to bikes” at Beacon Hill Reservoir so that 16th continues through. Would allow creation of a bike boulevard as an alternative to 15th.
12. Install bike friendly grates on Rainier.
13. Request to do something on Cheasty.
14. Provide centerline stripe on I-90 Trail.
15. Improve the existing Alaskan Way bike lanes north of Spokane. This includes widening, improving maintenance, and removing debris. Many people are also concerned about riding next to large trucks. The southbound lanes are worse than the northbound lanes. “To call this a bike lane is a joke. It is often unpainted broken pavement and glass.”
16. 17th Avenue between Beacon and I-90 trail is “commonly used by bikes”
17. Need better connections across I-5 in the area of Holgate, Lander, Spokane-suggested a funicular (gondola?).
18. Pave shoulders on Airport Way, S (south of Military Road)
19. Repave Coleman Park Road.
20. Repave Lake Washington Boulevard.
21. Rainier Avenue has horrible traffic and dangerous intersections.
22. Install bike-friendly grates on Rainier Avenue.
23. Broken glass on Seward Park Avenue and Rainier Avenue south of Cloverdale should be swept regularly.
24. Broken glass everywhere on 4th Avenue, S near Spokane
25. Provide new multi-use trail through Cheasty Greenspace, parallel to Cheasty Boulevard, and north through park properties to Bayview Street (include connection to Mt. Baker light rail station).
26. Provide underpass for bicycles where light rail tunnel goes under I-5 and up to Beacon Hill.
27. It is difficult to use median trail on Beacon Avenue because it is narrow and has bad street transitions and curb cuts.
28. Repave Rainier Avenue.
29. Enforce the speed limit on Lake Washington Boulevard.
30. Provide sharrows on Lake Washington Boulevard.
31. Improve the drainage on Lake Washington Boulevard—it is particularly bad in winter.
32. Provide sidewalk bike facilities on Orcas Street to help overcome hills.

Locations Suggested for Bicycle Lanes

1. East Marginal Way
2. Rainier Avenue between Orcas and Alaska (should do road diet to provide space for bike lanes) (“Make it Work”).
3. Along entire length of Alaskan Way (waterfront). Make the bike lanes on Alaskan Way “real bike lanes.”
4. Lake Washington Boulevard
5. Airport Way
6. Martin Luther King, Jr. Boulevard (do a road diet to create bicycle lanes)
7. Columbian Way
8. Beacon Avenue
9. Albro Place

10. Ellis Avenue
11. Boeing Access Road in Tukwila

Locations Suggested for Crossing Improvements

1. Alaskan Way/East Marginal Way/Spokane Street intersection is extremely dangerous.
2. Merge area at City Limit line on Airport Way, S.
3. Beacon Avenue intersections between 14th Avenue and 17th Avenue need better signal timing for bicycles.
4. Golf Drive/12th Avenue/I-90 Trail (add crosswalk)
5. Provide curb cut at Albrow Place & Swift Avenue to allow bicyclists to continue north on 17th Avenue, S.
6. 43rd Avenue & Lake Washington Boulevard, S. This is a dangerous intersection. Better sight distance is needed. Possibly use flashing warning lights.
7. Rainier Avenue intersections from Yesler to McClellan, especially at the I-90 on- and off-ramps. The sidewalk is a poor alternative because of gravel and glass.

Locations Suggested for Wayfinding Improvements

1. Need sign at intersection of Seward Park Avenue and Wilson Avenue that directs cyclists to Seward Park and Lake Washington Blvd.
2. Signage in the Georgetown Area
3. Signage to Seward Park from Seward Park Avenue, S at fork in road with Wilson Ave, S
4. Bicyclists commonly use 17th Avenue, S
5. Perimeter Road is a good route alternative to Airport Way.

Capitol Hill (North of I-90, South of Ship Canal, East of I-5)

Comments

1. Provide connection through Capitol Hill between I-90 Trail to U-District, possibly with bicycle lanes on Martin Luther King, Jr. Way and a bicycle boulevard on 28th Avenue/Prospect Street/26th Avenue/25th Avenue.
2. Provide connection between I-5 overpass and Capitol Hill using Belmont Avenue and Roy Street.
3. Provide trail system over Montlake lid with Pacific Interchange.
4. At the south end of the University Bridge, KC/METRO bus drivers on Route 49 repeatedly invade and sideswipe bicyclists in a clearly marked bicycling lane. This is unacceptable, unsafe, and illegal.
5. Difficult to bicycle on Montlake Boulevard/24th Avenue in either direction in the Montlake neighborhood.
6. Should provide better curb ramps to make it possible to use the sidewalks on 24th Avenue in Montlake area.
7. Boyer Avenue should be improved.
8. Add more bicycle racks at Madison Park Beach.
9. Construct ped/bike bridge across Montlake Cut as a part of the SR 520 project.
10. There are bad storm drains on Lake Washington Boulevard between SR 520 and 26th Avenue (on 26th Avenue).
11. Create a bicycle boulevard or use traffic calming on 28th Avenue/Prospect Street/26th Avenue/25th Avenue.
12. Create a bicycle boulevard on 27th Avenue between Harrison Street and Washington Street—needs better signage and warnings on cross streets.

13. Provide better bicycle accommodation on Broadway (special bicycle traffic lights, separation from cars, etc).
14. Prohibit cars from using the Arboretum.
15. Provide better connection across I-5 at Denny Way.
16. Improve Fuhrman Avenue from Eastlake to Capitol Hill.
17. Prohibit motor vehicles from using Interlaken Boulevard.
18. Union Street should have traffic calming—vehicles speed down hills.
19. Get rid of hidden curb extension on Prospect Street/28th Avenue.
20. Suggest Bike Boulevard on 11th Avenue between Thomas and Miller.
21. Request climbing lanes on Madison between 12th and MLK.
22. Add shoulders on Lake Washington Boulevard (or at least a climbing lane).
23. Repave Lake Washington Boulevard.
24. Enforce speed limit on Lake Washington Boulevard.
25. Repave Dearborn Street.
26. Repave Boren Avenue—southbound lanes are very rough.
27. Repave Pine Street between 12th Avenue and 19th Avenue.
28. Repave Eastlake Avenue.
29. Eastlake - complaint about delivery trucks, cars, etc. parking/double-parking/blocking “bike lane” [or outside travel lane].
30. Add centerline stripe to I-90 Trail on curve between Lake Washington Boulevard and Lakeside Avenue.
31. Construct ped/bike bridge from SR 520 to Madison Park neighborhood as a part of SR 520 reconstruction project.
32. Avoid further damage to Foster Island Wetland. 43rd Avenue E alignment for the bike trail connection to SR 520 will minimize wetland impact.
33. Provide a trail on SR 520 when it is constructed (like the I-90 Trail). This bridge is not currently served by buses, so a bicycle connection is critical.
34. Citizen reported breaking a jaw on bad paving near Judkins Street and 22nd Avenue, S
35. 23rd Avenue is scary because of buses, heavy traffic, and poor road conditions. A bike lane? Or good alternative routes North/South through Central District.
36. 23rd Avenue/24th Avenue is a great street for a road diet.
37. 20th Avenue may be a good potential route because it has few cars and stop signs—some other comments complained about curb extensions on this street
38. The Montlake Bridge/24th Avenue area is dangerous in the southbound direction due to cars trying to enter SR 520.
39. Provide bicycle access on sidewalks south of the Montlake Bridge to make it safer and clearer.
40. Widen the sidewalks south of the Montlake Bridge to make bicycling on the sidewalk more comfortable.
41. Provide wide outside lanes on Montlake Boulevard/24th Avenue south of the Montlake Bridge.
42. Add a new trail through the Arboretum to provide a north-south alternative to Arboretum Drive.
43. I-90 Trail: As you head east out of the bicycle tunnel it is hard to see bicyclists coming up off of the I-90 route (in vicinity of the I-90 Trail and Lake Washington Boulevard). There is poor visibility in the tunnel and it goes into a curve with high speeds.
44. Judkins Street (on north side of I-90 Trail) is a bad roadway because it is narrow, has blind turns, and a big hill.
45. Provide connection on Roanoke Street between Harvard Ave. and Delmar Dr., E.

46. Provide trail between Arboretum Drive and McGilvra Street to connect to Madison Park neighborhood.
47. 24th Avenue is a lousy route for sharrows in Montlake area; sign route on 25th Avenue instead.
48. 19th Avenue is a much better route than 23rd/24th Avenue.
49. Provide bicycle warning signs on Lake Washington Boulevard to remind drivers that it is a heavily-used bike route.
50. Open up the WS DOT access road under/adjacent to I-5 and allow it to become a trail between Colonnade Park and Belmont Avenue.
51. Use 16th Avenue instead of 15th Avenue between Pine and Highland to avoid a bad crossing.
52. Provide sharrows:
 - a. 15th Avenue between Yesler Way and Pine Street
 - b. 14th Avenue between Yesler Way and Pine Street
 - c. Jefferson Street between Broadway and 23rd Avenue
 - d. Aloha Street between 19th Avenue and 23rd Avenue (or use parallel street for this east-west connection)
 - e. Harvard Avenue
53. Aloha street does not have enough space for cars and bikes to share lanes between 12th Avenue and 19th Avenue.

Locations Suggested for Bicycle Lanes

1. Eastlake (remove the center turn lane because it has low vehicle use and add real bicycle lanes)
2. Cherry Street (do a road diet between Broadway and 20th Avenue; stripe simple bike lanes further east)
3. Extend Pine Street Bike Lane west into downtown and east to Madrona Drive
4. Want clearly marked bike lanes throughout on Eastlake.
5. 23rd Avenue between the Arboretum and King Street (this section would also benefit from traffic calming).
6. 24th Avenue between Boyer Avenue and Aloha Street.
7. 12th Avenue (complete the gap between Yesler Way and Beacon Hill).
8. 10th Avenue between Roy and Boston Street (sharrow is not good enough going north down Capitol Hill—need bike lanes on both sides).
9. 19th Avenue (between Galer Street and Yesler Way).
10. Montlake Boulevard south of Montlake Bridge.
11. Rainier Avenue north of I-90 Trail.
12. Union Street between Broadway and MLK.
13. Request bike lanes on Boren.
14. Bike lanes on Madison.
15. Fuhrman Avenue
16. MLK north of Union - Remove parking on west side to paint bike lanes - cheap solution.
17. Bike boulevard alternative to Arboretum - use diversions or speed traffic calming to eliminate bikes from using this route.
18. Broadway between James and Union.
19. Harvard Avenue
20. Extend existing bike lanes on Jackson west into Downtown.
21. Madison Street (Lake Washington Boulevard to Madison Park Beach)

Locations Suggested for Crossing Improvements

1. Blind corner at Lake Washington Blvd and Frink - need stop sign [not sure which leg]
2. Crossings of John Street between 19th Avenue and 32nd Avenue.
3. Dearborn Street & Rainier Avenue (signal sensor does not detect bicycles)
4. Pine Street & Boren Avenue
5. 10th Avenue & Roanoke Street
6. Southbound Lakeview crossing of I-5 on-ramp in vicinity of Howe Street.
7. Yesler Way & 20th Avenue (add bicycle detection loops for signal)
8. Union & Madison
9. Northbound exit ramp conflict on north side of University Bridge.
10. Frink Place & Lake Washington Boulevard (this is a blind corner—traffic on S Frink needs a stop sign)
11. Jefferson Street & 18th Avenue (buses wait near this intersection and block sight lines between motor vehicle drivers and bicyclists).
12. Eastlake Avenue & Harvard Avenue
13. Lake Washington Boulevard & Arboretum Drive (accommodate bicyclists in up hill direction; do not allow intersection to be squared off, as proposed in Arboretum Plan).
14. Interlaken Boulevard & 23rd Avenue
15. 12th Avenue & Olive Street
16. 15th Avenue & Olive Street
17. 16th Avenue & Aloha Street

Locations Suggested for Wayfinding Improvements

1. Improve signage on Dearborn Street at 12th Avenue
2. Route from UW area on west side of Arboretum connecting to Lake Washington Boulevard (using 28th Avenue/Prospect Street/26th Avenue/25th Avenue).
3. Add bike route signs to the Arboretum Bypass Route near the intersection of Madison & Lake Washington Boulevard. There should also be “bike route crossing”/“bike route ahead” signs oriented to traffic on Madison.
4. Add signs from I-90 Trail to Olmstead Legacy Trail.
5. Access to and along the I-90 Trail.
6. Sign route on Interlaken Boulevard between Delmar Drive and 24th Avenue.
7. Sign route on road that skirts the southeast side of Interlaken Park (between 24th Avenue and 19th Avenue)

Queen Anne

Comments

1. Give commute direction priority to bikes in the morning using the Fremont Bridge.
2. Continue the Dexter Bike Lanes across the Fremont Bridge.
3. Construct a trail that extends 6th Avenue to the north up to around Raye Street (new “bike viaduct”).
4. Need connection from Waterfront to Lower Queen Anne—Overpass at Thomas Street is good idea.
5. Important to provide a connection between Dravus Street and the South Ship Canal Trail/Emerson Street
6. Connect bicycle trail on Emerson Street to Gilman Avenue.
7. Emerson Street Trail is dangerous; it is difficult to get off curb on this road.
8. Eliminate parking at the crest of the hill on Nickerson Street.
9. Complete missing section of South Ship Canal Trail to the west.

10. Several requests for Sharrows and/or Share the road signs on 15th and Elliott.
11. There is a confusing stripe on the Elliott Bay Trail near the Galer Street overpass.
12. Improve the Elliott Bay Trail bridge overpass at the rail yard.
13. Elliott Bay Trail should be open 24/7.
14. Improve connectivity across Aurora Avenue.
15. Provide bike trail along the side of Aurora Avenue, continuing north over Aurora Bridge
16. Improve the condition/safety of the Dexter Avenue bicycle lanes.
17. Prohibit parking on Dexter to reduce door zone conflicts.
18. Address the hazards caused by many railroad track gaps.
19. Increase enforcement so that cars must park close to curb on Dexter. Also restrict parking near corners to improve sight distance to vehicles on cross streets; trim vegetation.
20. Need “Yield to Bicyclists” signs at the cross-street intersections with Dexter Avenue (particularly Queen Anne Drive/6th Avenue N)
21. Intersections of Dexter with angled streets (7th Avenue N and Broad Street) - Drivers making turns don’t yield to bicyclists - need signs saying yield to bikes.
22. Provide bicycle facilities on Olympic Way/10th Avenue connection across southwest Queen Anne.
23. Westlake Avenue should have bicycle lanes (it is an even better connection than Dexter because it is flatter).
24. Very hard to access S. Queen Anne from S. Lake Union. Must use sidewalk on Mercer to go under Aurora—this is scary and should be improved.
25. There should be a multi-use trail on the east side of Westlake Avenue.
26. On Westlake take 5 feet out of the parking lots and make a dedicated bike lane
27. Provide sharrows:
 - a. 15th Avenue (requires reducing motor vehicle travel speeds to less than 30 MPH)
 - b. Elliott Avenue (requires reducing motor vehicle travel speeds to less than 30 MPH)
 - c. Gilman Drive
 - d. Westlake Avenue
 - e. Florentia Street
 - f. Climbing lane is needed on 3rd Avenue W on north side of Queen Anne Hill
28. Need connection between Queen Anne and Capitol Hill.
29. Reconnect streets across Aurora Avenue and Broad Street in the Seattle Center Area.
30. There is an opportunity to provide a bicycle trail through Kinnear Park and the SW Queen Anne Greenbelt.

Locations Suggested for Bicycle Lanes

1. Westlake Avenue (entire length)
2. Nickerson Street
3. Emerson Street (15th Avenue to Gilman Avenue)
4. Improve existing bicycle lanes on Dexter Avenue. Extend the existing bicycle lanes through the intersections with a dotted line to remind turning drivers to yield.
5. Olympic Way/Olympic Place
6. West Mercer Street
7. 6th Avenue between Mercer and Galer
8. Elliott Avenue/15th Avenue

Locations Suggested for Intersection Improvements

1. Nickerson St. & Florentia St.

2. Nickerson St. & Emerson St.
3. 4th Avenue/Nickerson St./Westlake Avenue (mark bike lanes across the intersection)
4. Florentia Street immediately west of the Fremont Bridge (there is a blind spot with vegetation; construction is a real problem at the moment).
5. Bicycle signal and push button is needed at Nickerson Street at the south end of the Ballard Bridge.
6. Crossings of Aurora and Dexter in Broad Street area.
7. Queen Anne Avenue & Highland Drive (many bicyclists cross here)
8. Dravus Street & 15th Avenue W (bicyclists turning onto 15th need better accommodations)

Locations Suggested for Wayfinding Improvements

1. Show route from Dexter Avenue to Green Lake
- 2.

Magnolia

Comments

1. Keep trail across the locks open at all hours (not just 7 a.m. to 9 p.m.).
2. The trail across the locks is inadequate for bicyclists.
3. Improve lighting in the area south of the locks.
4. Repave Harley Street/Commodore Way/27th Avenue/Fort Street (this is a good route to use between Gilman Avenue and the trail across the locks.
5. Repave Commodore Way.
6. Magnolia Bridge: “I was accosted by police who told me I had to be on the sidewalk”.
7. Add a bicycle path to the Magnolia Bridge.
8. Need more connectivity in the Thorndyke Avenue Area at the end of the Elliott Bay Trail.
9. Trail connection is needed between 32nd Avenue/W Galer Street and W Marina Place/Elliott Bay Trail.
10. Address the hazards caused by many railroad track gaps.
11. Elliott Bay Trail is too narrow at several pinch points.
12. Need 24 hour public access on Elliott Bay Trail in area near Thorndyke Avenue.
13. Provide a trail connection between Elliott Bay Trail to Ballard Bridge and the Locks.
14. Need ground level access for bicyclists to travel east-west under the Magnolia Bridge.

Locations Suggested for Bicycle Lanes

1. On Magnolia Bridge
2. Commodore Way

Locations Suggested for Wayfinding Improvements

1. Sign a route along the lower section of Galer St, up 32nd Avenue, jog over on Clise Pl, to McGraw St., and then go north to 34th Avenue to connect between Magnolia Park and Discovery Park. (or from Galer to Clise Place/Vermont Way to 34th)
2. Provide better signage to help bicyclists get to the trail across the locks.
3. Sign a route from Ballard Bridge to Downtown that goes south on 15th Avenue, west on Dravus Street, south on 20th Avenue, and south on the Elliott Bay Trail.
4. Sign a scenic bike route around the perimeter of Magnolia using Magnolia Boulevard/Government Way/Gilman Avenue/Thorndyke Avenue
5. Improve wayfinding through Discovery Park.

Ballard (West of 8th Avenue, between Ship Canal and 85th Street)

Comments

1. Complete the Burke-Gilman Trail through Ballard.
2. Provide climbing lane on Seaview Place between Golden Gardens Park and 32nd Avenue.
3. Please make short-term improvements to help at the Ballard Bridge until a long-term plan materializes. The bridge is currently dangerous because it is too narrow.
4. Find a good east-west arterial between 70th and 90th Streets and give it major bike lane status.
5. The idea for a new pedestrian/bicycle bridge across the ship canal in the vicinity of 9th or 11th Avenue is a good idea for the future, but the immediate need to improve the existing Ballard Bridge must be addressed.
6. The idea for a new pedestrian/bicycle bridge across the ship canal in the vicinity of 9th or 11th Avenue sounds expensive. Provide major bicycle and pedestrian facilities on the existing Ballard Bridge instead.
7. The Ultra-Narrow sidewalk on Ballard Bridge needs to be improved somehow.
8. What is the priority on Shilshole Avenue—bikes or trucks?
9. Provide a bike path/route on Market Street rather than complete the Burke-Gilman Trail on Shilshole because it would provide better connectivity to the Ballard neighborhood and create less conflict with railroad tracks.
10. Make 15th Avenue more accessible to bicycles to help improve connectivity to Downtown Seattle.
11. Improve pavement in southbound lane on 8th Avenue NW between 85th Street and Leary

Locations Suggested for Bicycle Lanes

1. 24th Avenue
2. 8th Avenue (complete designated bike lane on entire length of street; pavement needs to be evened out; parked cars south of 50th Street are very close to where the bike lane would go, so there may be dooring hazards)
3. Market Street
4. 65th Street
5. 80th Street
6. 45th Street

Locations Suggested for Intersection Improvements

1. 9th Avenue & 65th Street (add a pedestrian/bicycle signal)
2. 9th Avenue & Market Street (add a pedestrian/bicycle signal)
3. 9th Avenue & Leary Way (add a pedestrian/bicycle signal)
4. 45th Street and 9th Avenue (fix the railroad crossing near this intersection)
5. Shilshole Avenue between 14th and 17th Avenues (make the railroad track crossings on this key Burke-Gilman Trail connection safer).
6. Shilshole Avenue & 17th Avenue (need better crossing of Shilshole).
7. 15th Avenue & Market Street (provide signage for bikes at this location).
8. Ballard Avenue & Leary Way (blind corner; especially dangerous with fast traffic coming off of Leary)
9. Ballard Avenue & 17th Avenue
10. Shilshole Avenue & 45th Street (provide a traffic signal)

11. 54th Street & 32nd Avenue (Traffic light should be modified to detect bicycles and give them a green light automatically).

Locations Suggested for Wayfinding Improvements

1. Designate bike route on 62nd Street between 28th Avenue and 8th Avenue.
2. Designate bike route on 22nd Avenue between Market Street and 62nd Street.

Fremont (Between 8th Avenue and Stone Way, between Ship Canal and 85th Street)

Comments

1. 3rd Avenue W should be improved/repaved between 50th and 90th Streets
2. Improve 3rd Avenue W, in general
3. Provide a pedestrian/bicycle bridge across the Ship Canal at 3rd Avenue W (in addition to improving conditions on the Ballard Bridge).
4. 39th Street should be improved with a bike lane and signage.
5. Woodland Park Avenue is a wide road that is perfect for a bikeway.
6. Enforce no parking on Green Lake Way W.
7. Improve pavement on Winona Avenue.
8. Fill the expansion joints on 50th Avenue in Fremont—they cause accidents.
9. Provide share the road signs on 46th Avenue as it goes under Aurora Avenue
10. Bicycles should be given priority at intersections between Burke-Gilman Trail and Fremont Bridge access; existing 4-way stops do not work well.
11. Complete the missing section of the Burke-Gilman Trail near the Fremont Bridge.
12. Extend bicycle accommodations from Green Lake Drive N to the west on 83rd Street.
13. Improve pavement condition on Stone Way (particularly in southbound direction).

Locations Suggested for Bicycle Lanes

1. Linden Avenue between 73rd Street and 90th Street
2. 83rd Street between Linden Avenue and existing lanes on Green Lake Drive N.
3. Stone Way
4. Market Street
5. 46th Street (full bike lanes, or provide climbing lane between Midvale Avenue and Fremont Avenue).
6. 45th Street
7. Winona Avenue
8. 65th Street
9. 80th Street
10. Bridge Way

Locations Suggested for Intersection Improvements

1. Greenwood Avenue & 77th Street (traffic signal is needed along this mapped bike route)
2. Green Lake Drive N & Aurora Avenue & 83rd Street (need to improve the transition for bikes between the right side of the road and the left turn lane).
3. Dayton Avenue & 85th Street (push button is needed at signal)
4. Stone Way & Bridge Way
5. E Green Lake Way N & W Green Lake Way N (keep cars from crowding bicyclists at the end of the bike lane).
6. Woodland Park Avenue & Bridge Way
7. Winona Avenue & Green Lake Drive N & Densmore Avenue

8. 65th Street & Linden Avenue & Aurora Avenue
9. Stone Way & 45th Street

Locations Suggested for Wayfinding Improvements

1. Need signs showing the connection from Burke-Gilman Trail to Green Lake (possibly using Stone Way)
2. Provide more east-west connections between 70th and 90th Street northwest of Green Lake.

Wallingford (Between Stone Way and I-5, between Ship Canal and 85th Street)

Comments

1. Pave a path under I-5 between 5th Avenue & 42nd Street and 6th Avenue and 40th Street.
2. Drainage grates are a problem on 40th Street
3. East-west connections through Wallingford are critical.
4. Dangerous bollards on the Burke-Gilman Trail need to be painted (at Burke Avenue and Meridian Avenue)
5. Improve pavement on Ravenna Boulevard.
6. The bike lanes on Ravenna Boulevard should be on the right side of the roadway.
7. The bike lanes on E Green Lake Drive N are dangerous because of car doors opening into the bike lanes and drivers making turns across the bike lanes.
8. Great to provide a pedestrian/bicycle bridge over I-5 between 45th and 50th Streets, if it is affordable.
9. Widen Wallingford Avenue between 80th Street & 90th Street.
10. Remove parking on west side of Wallingford Avenue between 80th and 85th Street.
11. Need many more bicycle signs and pavement markings on Ravenna Boulevard because many motorists do not expect bicyclists on the left side of the road.
12. Signs should be posted on Northlake Way to remind drivers of the adjacent Burke-Gilman Trail.
13. Add a pedestrian/bicycle bridge across Green Lake to connect 65th Street on both sides of the lake.
14. Sharrows should be provided on:
 - a. Wallingford Avenue between Burke-Gilman Trail and Green Lake

Locations Suggested for Bicycle Lanes

1. 45th Street (major artery of travel that needs bicycle lanes).
2. 50th Street
3. 40th Street between Stone Way and I-5 (bike lane needs to be redrawn). Signs could be provided, too.
4. Wallingford Avenue N, between Green Lake Drive N and 92nd Street.
5. 80th Street

Locations Suggested for Intersection Improvements

1. Ravenna Boulevard & Woodlawn Ave.
2. Ravenna Boulevard & Green Lake Drive
3. Green Lake Drive N & 78th Street
4. W Green Lake Way N & E Green Lake Way N
5. 50th Street & Wallingford Avenue (need traffic signal to be able to detect bicycles).

Locations Suggested for Wayfinding Improvements

1. Sign east-west route on 46th and 47th Streets that would use a proposed pedestrian/bicycle bridge over I-5.

University District (East of I-5, between Ship Canal and 85th Street)

Comments

1. Provide a trail connection through Gwen Park and Ravenna Park that would connect the Ravenna Boulevard bike lanes, which end at Brooklyn Avenue, with the Burke-Gilman Trail (near 25th Avenue).
2. Special attention should be given to improving Ravenna Boulevard between the Burke-Gilman Trail and NE 55th Street.
3. Connections from the University Bridge to the Burke-Gilman Trail need to be improved.
4. The traffic signals along the Burke-Gilman Trail in the University Area should detect bicycles.
5. Repaint bike symbols on Ravenna Boulevard.
6. The bicycle facility on 40th Avenue under the University Bridge should have better signage—cars often drive down the bike-only lane without realizing that it is closed to vehicles.
7. Provide climbing lane on 65th Street between 25th Avenue & 15th Avenue.
8. Provide climbing lane on 35th Avenue between Burke-Gilman Trail and 65th Street.
9. Provide more group bicycle racks in specific locations on Brooklyn Avenue.
10. Improve 15th Avenue between 42nd Street and 45th Street.
11. Tow illegally parked cars on 11th Avenue and Roosevelt Way more promptly.
12. 11th Avenue and Roosevelt Way need to be improved, especially near Campus Parkway.
13. Lake City Way has unsafe drainage grates in the shoulder.
14. 20th Avenue across Ravenna Park should not have cars.
15. Curb lane should be widened on Lake City Way.
16. Need more bike-friendly north-south corridors through the U-District.
17. Pave gravel trail in vicinity of Sand Point Way & 50th Avenue so children can get from Burke-Gilman Trail to Laurelhurst Elementary School easily.
18. Add sharrows:
 - a. Roosevelt Way
 - b. 11th Avenue
19. Roadway pavement should be improved in the following locations:
 - a. Eastlake Avenue near University Bridge
 - b. 40th at Eastlake at north University Bridge Approach
 - c. Lake Washington Boulevard storm drains
 - d. Montlake Bridge
 - e. Ravenna Boulevard
 - f. 17th Avenue north of UW Campus and south of Ravenna Park

Locations Suggested for Bicycle Lanes

1. Montlake Bridge
2. Brooklyn Avenue
3. University Way
4. 45th Street
5. 35th Avenue (or climbing lane between Burke-Gilman Trail and 65th Street)
6. 40th Avenue (or other type of bicycle facility—this is a good connection)
7. Entire length of 65th Street (or provide sharrows and climbing lanes)

8. 75th Street (it is hilly, but it is a wide roadway)

Locations Suggested for Intersection Improvements

1. Burke-Gillman Trail & University Way (walk signals should also have a bike symbol on them)
2. Burke-Gillman Trail & Brooklyn (walk signals should also have a bike symbol on them)
3. North end of University Bridge (should add traffic light instead of slip lanes from northbound lanes of bridge).
4. Path next to eastern overpass to the UW Hospital is a severe merge hazard (pedestrians crossing the Burke-Gilman Trail).
5. Montlake Boulevard & Pacific Place
6. Ravenna Avenue & 54th Street
7. Ravenna Avenue & University Way
8. Burke-Gilman Trail at 25th Avenue.
9. Burke-Gilman Trail at 30th Avenue (suggest speed humps on road to slow vehicles, speed humps on trail to slow bikes, and overhead crosswalk sign to warn drivers about trail).

Locations Suggested for Wayfinding Improvements

1. Signage directing bicyclists from the Burke-Gilman Trail to Magnuson Park
2. Sign the route between the Burke-Gilman Trail and Green Lake.
3. Need to designate good east-west routes north of UW.
4. Signage should be provided to show the good east-west route on 47th Street.
5. Signs should be used to show how to get from the UW Campus to the Montlake Bridge.

Northwest Seattle (West of I-5, North of 85th Street)

Comments

1. Finish the Interurban Trail between 110th Street and 90th Street.
2. Construct the Interurban Trail as a pathway that is separated from the roadway, parallel to Linden Avenue (on the east side of Linden) between 128th Street and 145th Street.
3. Build bicycle and pedestrian bridge and trail from the intersection of 97th & College Way through the North Seattle Community College Campus, across I-5, and connecting to the intersection of 1st Avenue & 100th Street (this comment was made by a number of people)
4. Greenwood Avenue should be repaved/reconstructed with bike lanes between 73rd and 145th Streets
5. Reconstruct/widen Fremont Avenue between 85th and 105th Street and add bicycle lanes.
6. Improve the route between Northgate and Shoreline (this route uses Meridian Avenue, 122nd Street, Densmore Avenue, 125th Street, and Ashworth Avenue).
7. Need better east-west connections between 8th Avenue and the I-5 Corridor through this section of the City; particularly between 85th Street and 110th Street.
8. Turn Dayton Avenue into a bicycle boulevard.
9. Improve gravel trail that is a northward extension of Midvale Avenue from approximately 110th Street to 128th Street.
10. Need to work with Shoreline and Montlake Terrace (north of the City limit) to create a regional path north of the Interurban Trail to connect Seattle with the employment

areas in Mountlake Terrace (east of I-5). Ballinger Way is dangerous. 15th Avenue is very hilly. Prefer a sidepath from Meridian east along Ballinger Way.

Locations Suggested for Bicycle Lanes

1. Aurora Avenue
2. 90th Street between Dayton Avenue and Wallingford Avenue
3. 15th Avenue between Holman Road and 105th Street (suggestion to remove parking on one side of the street between Holman Road and 100th Street)
4. 100th Street between 15th Avenue and 8th Avenue (climbing lane)
5. Dayton Avenue between 85th Street and 105th Street
6. Linden Avenue between 73rd Street and 90th Street
7. Wallingford Avenue between Green Lake Drive and 92nd Street

Locations Suggested for Intersection Improvements

1. 145th Street & Linden Avenue (needs a traffic signal and marked crosswalk)
2. 130th Street & Linden Avenue (provide push button that can be used by a bicyclist or signal that detects bicyclists automatically)
3. 105th Street & Dayton Avenue (provide push button that can be used by a bicyclist or signal that detects bicyclists automatically)
4. 105th Street & Greenwood Avenue
5. 100th Street & Dayton Avenue (need stop signs for traffic crossing Dayton Avenue)
6. 95th Street & Dayton Avenue (need stop signs for traffic crossing Dayton Avenue)
7. 90th Street & Dayton Avenue (need stop signs for traffic crossing Dayton Avenue)
8. 100th Street & Greenwood Avenue (need stop signs for traffic crossing Greenwood)
9. 95th Street & Greenwood Avenue (need stop signs for traffic crossing Greenwood)
10. 90th Street & Greenwood Avenue (need stop signs for traffic crossing Greenwood)
11. Crossings of Aurora Avenue from Interurban Trail (145th, 137th, 135th, 130th, 128th, 125th, 105th)

Locations Suggested for Wayfinding Improvements

1. Sign 1st Avenue NW as a bicycle route—this is an alternative to Greenwood Avenue between 105th Street and 130th Street.

Northeast Seattle (East of I-5, North of 85th Street)

Comments

1. Lake City Way corridor is critical for bicycling—bicycle accommodations should be provided on Lake City Way or nearby parallel streets.
2. Burke-Gillman Trail should be widened between 95th and 145th Streets
3. The stop signs at Burke-Gilman Trail intersections with private driveways should be placed to stop cars, not the bikes on the trail. The stop signs should also be on some low-volume roadways where they cross the trail (rather than stopping bikes on the trail).
4. Ravenna/25th Avenue should be repaved between 80th and 95th Streets
5. Need bicycle improvements in the Northgate Area
6. Provide a consistent shoulder/wide outside lane width on Lake City Way—the existing cross-section changes abruptly from wide outside lane to narrow lane.
7. Need better east-west access between northeast neighborhoods and Burke-Gilman Trail.

8. 105th Street/Fisher Place should be improved to provide connection between Lake City Way and the Burke-Gilman Trail.
9. Provide more bike lanes and trails in North Seattle.
10. Thornton Creek Trail could provide a bicycle connection between 98th Street & 20th Avenue and Roosevelt Way & 108th Street.
11. Construct a Thornton Creek Bike Trail between Northgate and Lake City Way.
12. Pave shoulder on 15th Avenue between 94th Street and Northgate Way.
13. There is a rough spot of pavement on the southbound side of Sand Point Way at a bus stop near 123rd Street—this should be fixed.
14. Bicycles should be allowed to use the transit only lane on Lake City Way in Lake Forest Park (north of the City limit).
15. Condition of Burke-Gilman Trail in Lake Forest Park (north of City limit) should be improved.

Locations Suggested for Bicycle Lanes

1. Northgate Way
2. 125th Street
3. 95th Street between 35th Avenue and Sand Point Way
4. 5th Avenue

Locations Suggested for Crossing Improvements

1. Burke-Gilman Trail & Sand Point Way (and other street crossings of B-G Trail in Northeast Seattle)
2. Woodlawn & 50th (needs a signal)
3. Latona & 50th (needs a signal and sensor)
4. 137th & Greenwood (needs a signal)
5. Ravenna & Greenlake Way & 71st (signal or roundabout needed)
6. 95th Street & Ravenna Avenue (difficult to cross because of concrete barrier in the middle).
7. 145th & Dayton and Shoreline Trail (signal to be added)
8. 1st Avenue between 92nd Street and 100th Street
9. Northgate Way under I-5 (glass on sidewalk)
10. Lake City Way & 145th Street (need bicycle detection at the traffic signal, particularly in the southbound left-turn lane).
11. Lake City Way & 104th Street (there is a signal and a push button, but bicyclists often don't use push button—even if you use the push button, it is a very dangerous intersection to walk bicycle across from west to east side).

Locations Suggested for Wayfinding Improvements

1. Street signs should be provided along the length of the Burke-Gilman Trail through Northeast Seattle that show what street the trail is crossing.
2. Signs should also be used to identify the trail to motorists at trail-roadway intersections along the Burke-Gilman Trail.
3. Sign the link between the Burke-Gilman Trail and the Wedgewood neighborhood (use NE 93rd Street, 45th Avenue NE, NE 92nd Street, 42nd Avenue NE, and NE 88th Street).
4. Sign a route from Meadowbrook Playfield and Lake Forest Park.

Online Survey Responses

1584 Respondents

62% Male, 38% Female

Average Age: 41 years

1. Based on your experience, which Seattle streets are best for bicycling? (Be as specific as possible about location, for example: NE Ravenna Boulevard between University Way NE and East Greenlake Way N.)
 - Dexter - 427
 - Lake Washington blvd. - 245
 - Ravenna - 220
 - 8th Ave - 147
 - Eastlake - 80
2. Which Seattle streets are worst for bicycling? Please be as specific as possible.
 - 15th Ave - 174
 - Rainier - 133
 - Eastlake - 119
 - Westlake - 116
 - Lake Wash Blvd - 108
3. What are the best off-street routes (paved trails or sidewalks) in Seattle?
 - Burke Gilman - 920
 - I-90 - 201
 - Myrtle Edwards - 165
 - Alki - 113
 - Elliot Bay - 75
4. What are the worst off-street routes (paved trails or sidewalks) in Seattle?
 - Burke Gilman - 270
 - Alaska - 30
 - Greenlake - 30
 - Ballard Br - 21
 - Duwamish - 15
5. On which streets would you like to see bicycle lanes or other bicycle facilities? (Please be specific.)
 - Eastlake - 91
 - Westlake - 56
 - Lake Washington Blvd. 46
 - Rainier - 42
 - Stoneway - 30
6. At which locations would you like to see spot improvements? (For example a bridge, railroad crossing or intersection. Please be specific.)
 - Ballard Br. - 119
 - Burke Gillman - 46
 - Fremont Br. 40
 - Montlake Br - 10
 - Alaska - 10

7. At which locations would you like to see additional bicycle parking (racks or lockers) provided? (Please provide a neighborhood, address, intersection, business name, transit station or shopping district.)

- Downtown - 44
- Montlake - 30
- University Village/ District - 30
- Westlake Mall - 20
- Pike Place Market - 10

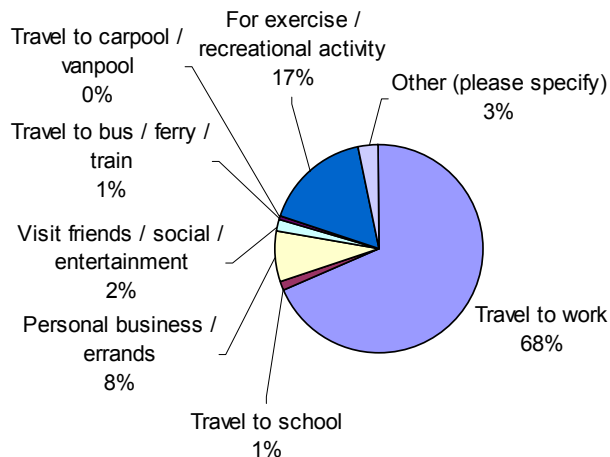
8. On which routes do you think it is important to provide bike route signs?

- All/Any - 70
- Dexter - 25
- Burke Gilman - 20
- Downtown (various) - 20
- Lake Washington - 20

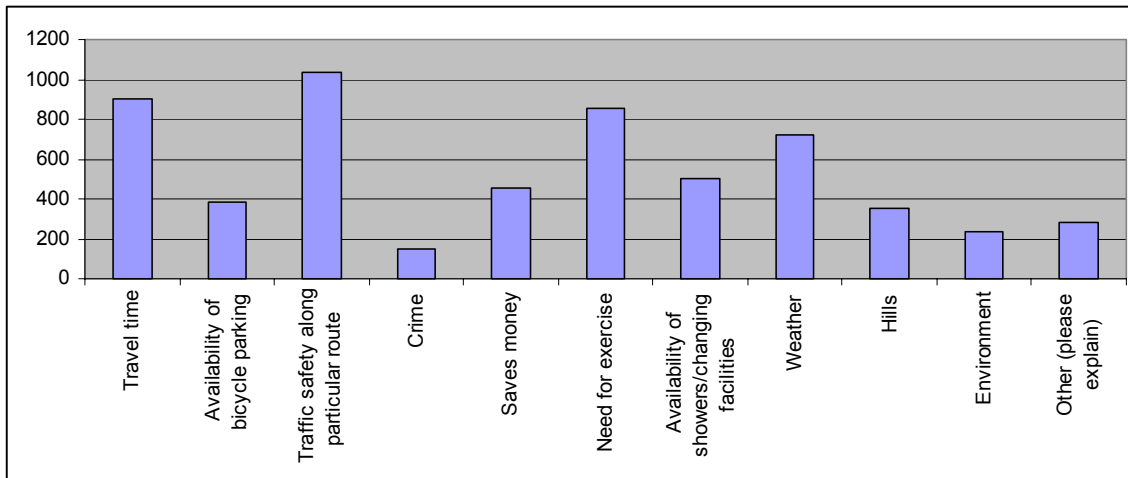
9. Which locations do you think would benefit from signs with directional information? (For example a particular bridge access point, trail access point, or highway crossing. Please be specific.)

- Ballard Br. - 50
- Burke Gillman - 20
- Fremont Bridge - 20
- I 90- 20
- West Seattle Br 10

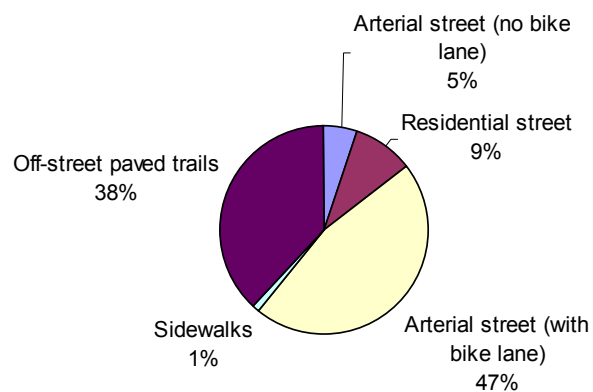
10. What was the primary purpose of your last bicycle trip? (Please circle only one answer.)



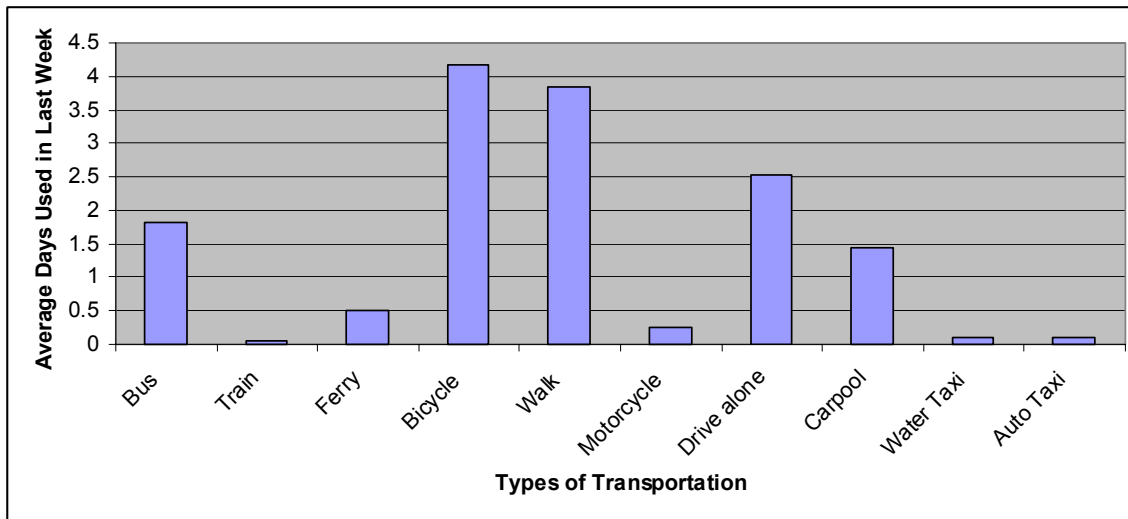
11. Which of the following factors plays a role in whether or not you ride your bike to your destination? (Circle as many as apply.)



12. When making a bicycle trip, which of the following do you prefer to use? (Circle only one answer.)



13. Enter how many days, during the last week, that you used each of the following types of transportation? (Enter 0-7 for each mode. It's ok if your grand total is greater than seven.)



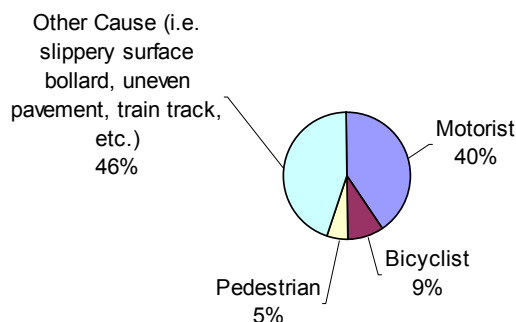
14. Do you have an automobile available to you for trip making?

- Yes-92%
- No-8%

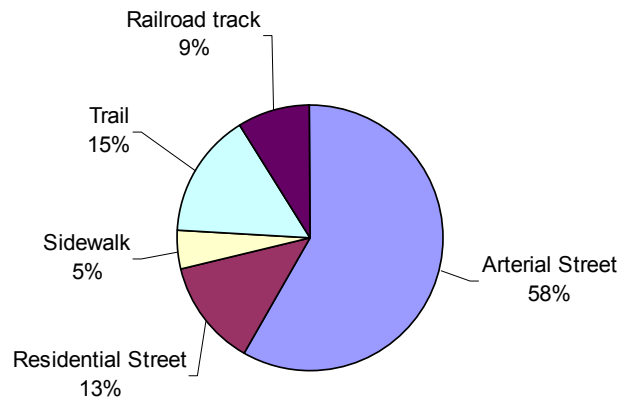
15. In the last week, did you take your bike on the following modes of public transportation?

	Yes	No
Bus	20%	80%
Ferry	9%	91%
Train	1%	99%

16. If you have been involved in a crash while riding your bike in the City of Seattle, please circle the responses below indicating who (or what) else was involved in the crash. (Question 19 allows you to provide information about additional crashes, if applicable.)



17. If you have been involved in a crash while riding your bike in the City of Seattle, please circle the response below indicating the type of facility where the crash occurred. (Question 19 allows you to provide information about additional crashes, if applicable.)



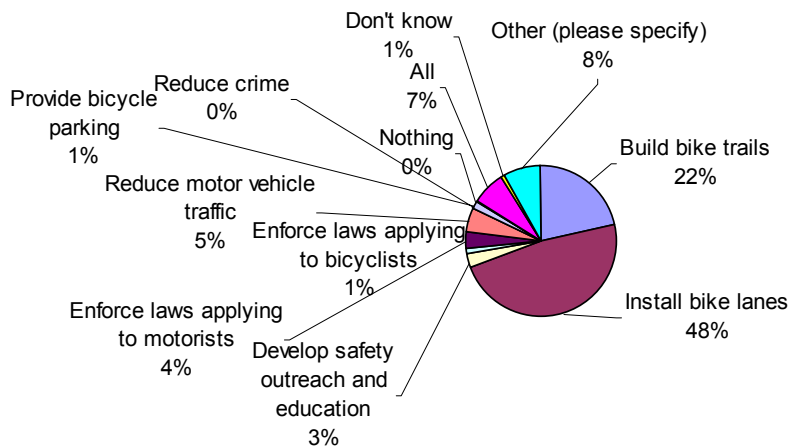
18. If you indicated in the previous question that you have been involved in a bicycle crash in the City of Seattle, please provide the location of that crash. (Question 19 allows you to provide information about additional crashes, if applicable.)

Summary not available.

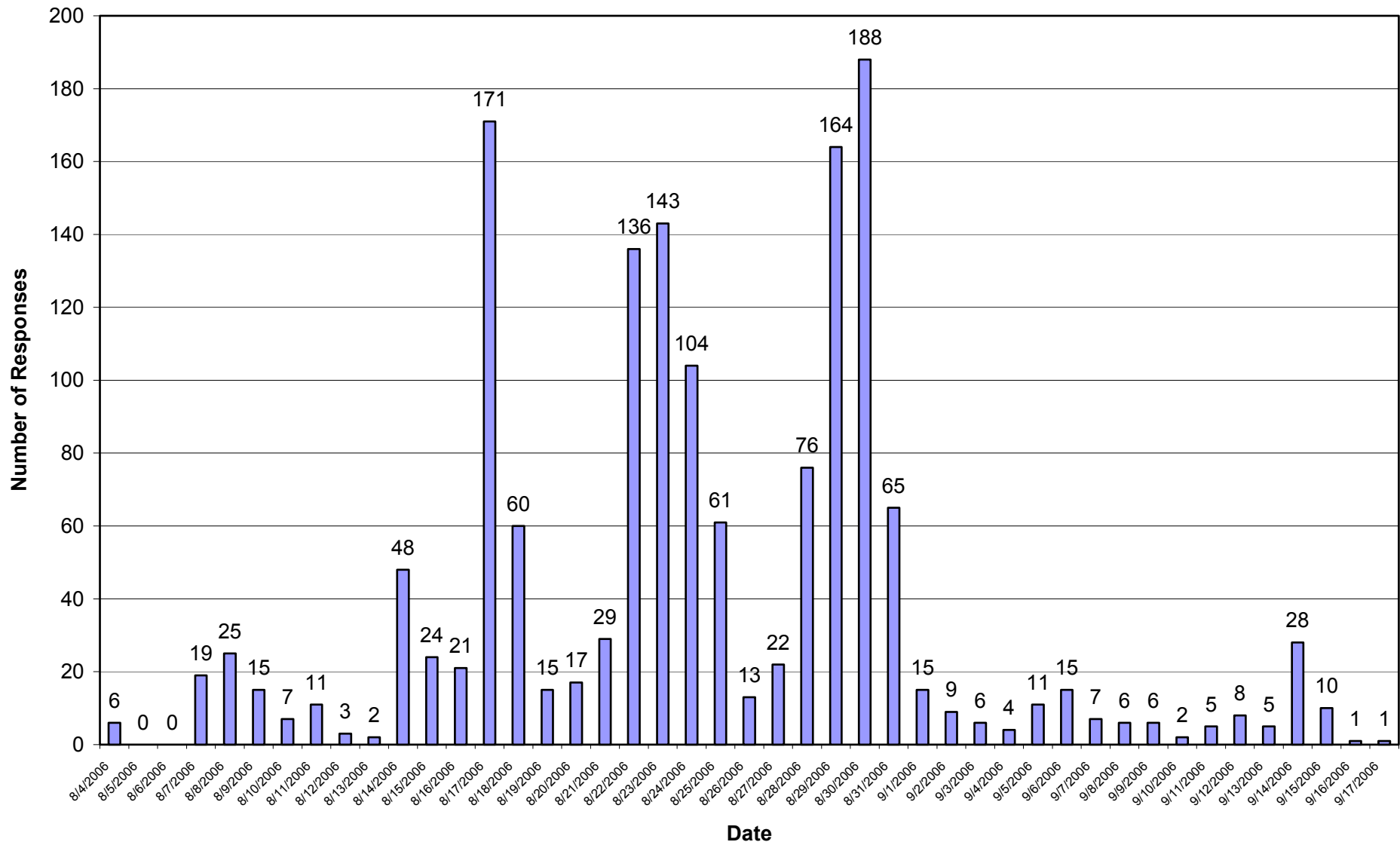
19. If you would like to provide information about additional bicycle crashes, please describe the incidents below. If possible, include who (or what) else was involved in the collision, the type of facility where it occurred, and the location of the collision.

Summary not available.

20. Which of the following factors do you think would do the most to encourage bicycling in the City of Seattle? (Please circle only one.)



Seattle Bicycle Master Plan Online Survey Responses



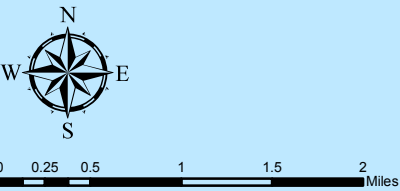
APPENDIX B: LIST OF MEETINGS HELD DURING THE PLANNING PROCESS

June 13, 2006: SDOT Internal Staff Kick-Off Meeting
June 14, 2006: Citizens Advisory Board Kick-Off Meeting
June 15, 2006: SDOT Traffic Engineering Meeting
July 12, 2006: Citizens Advisory Board Meeting
July 13, 2006: SDOT Traffic Engineering Meeting
August 29, 2006: Puget Sound Regional Council Meeting
August 29, 2006: Public Meeting for Gathering Input (University of Washington)
August 30, 2006: SDOT Policy and Planning Staff Meeting
August 30, 2006: Citizens Advisory Board Meeting
September 20, 2006: Citizens Advisory Board Meeting
October 17, 2006: Freight Mobility Access Committee Meeting
October 17, 2006: Seattle Department of Parks and Recreation Meeting
October 17, 2006: SDOT Traffic Engineering Meeting
October 18, 2006: Seattle Internal Staff Update Meeting
October 18, 2006: Citizens Advisory Board Meeting
November 13, 2006: SDOT Policy and Planning Staff Meeting
November 13, 2006: SDOT Pedestrian Staff Meeting
November 14, 2006: SDOT Traffic Engineering Meeting
November 15, 2006: SDOT and KC/METRO Transit Meeting
November 15, 2006: Citizens Advisory Board Meeting
December 5, 2006: Public Meeting on Draft Plan (Ballard)
December 6, 2006: Puget Sound Regional Council Meeting
December 7, 2006: Public Meeting on Draft Plan (Columbia City)
December 8, 2006: SDOT Policy and Planning Staff Coordination
December 12, 2006: Queen Anne Neighborhood
December 14, 2006: Public Access Television Roundtable discussion on Bike Master Plan
December 21, 2006: Department of Neighborhoods District Coordinators Meeting
December 27, 2006: KC/METRO Transit Meeting

APPENDIX C: KEY LOCATIONS FOR COORDINATING BICYCLE FACILITY DESIGN WITH FUTURE RAPID TRANSIT SERVICE

Figure C.1. Roadways for Bicycle and Transit Coordination (see next page)

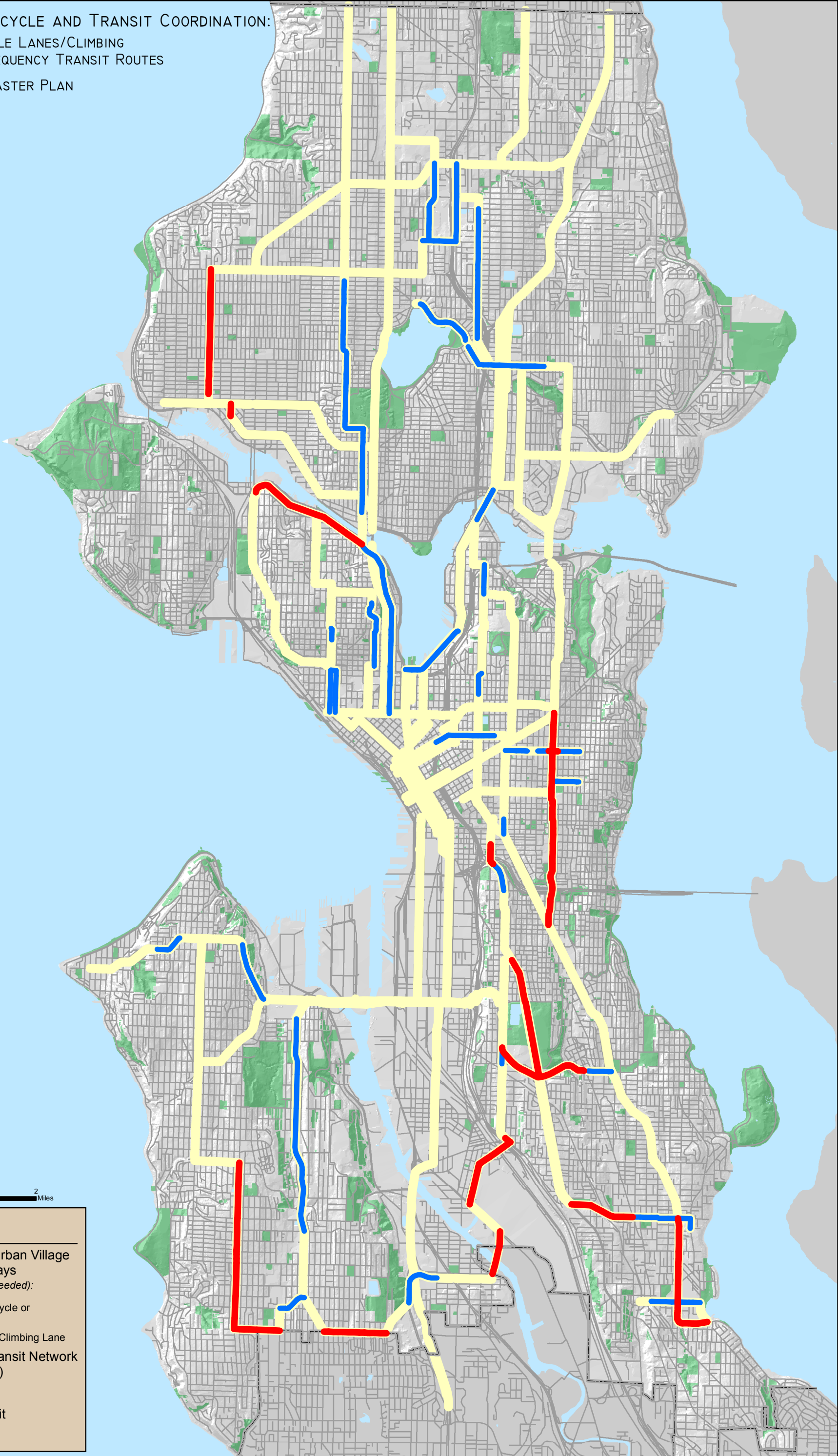
ROADWAYS FOR BICYCLE AND TRANSIT COORDINATION:
ROAD DIETS & BICYCLE LANES/CLIMBING
LANES AND HIGH FREQUENCY TRANSIT ROUTES
SEATTLE BICYCLE MASTER PLAN
3/15/07



Legend

Recommendations on Urban Village
Transit Network Roadways
(Additional Coordination Needed):

- Road Diet to Bicycle or Climbing Lane
- Other Bicycle or Climbing Lane
- Urban Village Transit Network (High Priority)
- Road
- Seattle City Limit
- Park



APPENDIX D: KEY LOCATIONS FOR COORDINATING BICYCLE FACILITY DESIGN WITH FREIGHT TRANSPORTATION

Figure D.1. Roadways for Bicycle and Freight Coordination (see next page)



Legend

Recommendations on Major Truck Streets *(Additional Coordination Needed)*

- Road Diet to Bicycle or Climbing Lane
- Other Bicycle or Climbing Lane
- Major Truck Street
- Road
- Seattle City Limit
- Park

APPENDIX E: BICYCLE FACILITY DESCRIPTIONS

This appendix provides general descriptions of the types of bicycle facilities recommended for the Seattle Bicycle Facility Network. There are two main categories of facilities: facilities for network segments and facilities for roadway crossings. Additional design details for these facilities are provided in Appendix F and Appendix H.

Types of Facilities for Network Segments

The Bicycle Facility Network includes a variety of on- and off-road bicycle facilities. On-road bicycle facilities serve several purposes, including designating roadway space for bicyclists, channelizing motor vehicles and bicyclists, making bicyclist movements more predictable, indicating the proper direction for bicyclists to travel on the roadway, and indicating the optimal location on the street for riding at mid-block locations and when approaching intersections. Off-road bicycle facilities, including multi-purpose trails and sidepaths, provide a space for bicyclists to be physically separated from roadway traffic. The specific types of facilities that are recommended on each segment of the network depend on a wide range of factors, including:

- Surrounding land uses and connectivity to destinations
- Existing right-of-way space
- Number of travel lanes
- Travel lane width
- Traffic volume
- Traffic speed
- Traffic composition (presence of buses and large trucks)
- Presence of on-street parking
- Pedestrian activity

Bicycle facilities are recommended for segments in the Network are described below. Additional detail is provided in Appendix F: Guidance for Retrofitting Seattle Streets to Create Dedicated Bicycle Facilities and Appendix H: Roadway Crossing Design for Bicycles.

Bicycle Lanes

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential use of bicyclists. The minimum width for a bicycle lane next to parked cars is five feet (four feet if next to a curb). Bicycle lanes include a bicycle pavement marking with an arrow to indicate that bicyclists should ride in the same direction as adjacent motor vehicle traffic. These facilities are recommended for arterial roadways in Seattle. Bicycle lanes provide the following benefits:

- Increase the comfort of bicyclists on roadways
- Increase the amount of lateral separation between motor vehicles and bicycles
- Indicate the most appropriate location to ride on the roadway with respect to moving traffic and parked cars, both at mid-block and approaching intersections
- Increase the capacity of roadways that carry mixed bicycle and motor vehicle traffic
- Make bicyclist and motorist movements more predictable
- Make drivers more aware of bicyclists while driving and when opening doors from an on-street parking space

When on-street parking exists, bicycle lanes should be designed so that bicyclists are encouraged to ride far enough away from parked cars so that they are not at risk of being struck by opening doors. Further, bicycle lanes should not be placed between parked cars and the curb, for the following reasons:

- Motor vehicles entering the arterial roadway from a side street must cross through the bicycle pathway to view arterial roadway traffic around the parked cars. This takes driver attention away from bicyclists and blocks the bicycle pathway.
- To make a left turn, bicyclists must merge into the travel lanes from behind a line of parked cars, creating a situation with poor sight lines between motorists and bicyclists. If parking is fully-utilized, this may not even be possible.
- Motor vehicle passengers are not accustomed to looking for bicyclists when they open their doors on the right side of the vehicle.
- If the facility is a two-way bicycle pathway, bicyclists are encouraged to ride in the opposite direction of adjacent motor vehicle traffic, making them vulnerable to motor vehicle drivers who only look to their left when turning right from a side street.
- Roadway space is not used efficiently. Roadways with on-street parking require some space for car doors to open safely. This space is needed along both sides of the road on the driver's side of parked cars. When one line of cars is moved away from the curb to make room for the bicycle facility, several feet of shy distance are needed on both sides of that line of parked cars, rather than just on the drivers side. Overall, more roadway space is needed for car doors to open, so less space can be used for other purposes.

Shared Lane Pavement Markings

Shared lane pavement markings (or “sharrows”) are bicycle symbols that are placed in the roadway lane. Unlike bicycle lanes, they do not designate a particular part of the roadway for the use of bicyclists. The bicycle symbols used in shared lane pavement markings include chevrons pointing in the direction motor vehicle traffic to indicate that bicyclists should also ride in this direction. Shared lane pavement markings have the following benefits:

- Provide a visible cue to bicyclists and motorists that bicycles are to be expected and welcomed on the roadway
- Indicate the most appropriate location to ride on the roadway with respect to moving traffic and parked cars
- Can be used on roadways where there is not enough space for standard four- or five-foot-wide bicycle lanes
- Connect gaps between other bicycle facilities, such as a narrow section of roadway between road sections with bicycle lanes

Climbing Lanes

Climbing lanes are a hybrid bicycle facility that include a five-foot bicycle lane on one side of the roadway (typically in the uphill direction) and a shared lane pavement marking on the other side of the roadway. This allows slower-moving, uphill bicyclists to have a designated bicycle lane space and allows motor vehicles to pass more easily. It also allows faster-moving, downhill bicyclists to have a shared-lane pavement marking, which helps make motorists be aware that the faster-moving bicyclists are more likely to move away from parked cars and merge into the travel lane. The bicycle lane and shared lane pavement markings also indicate the proper direction for bicyclists to travel on either side of the street. This type of facility is particularly useful in Seattle because of its topography and because it can be used on streets where there is not enough space for standard four to five-foot-wide bicycle lanes on both sides.

Bicycle Boulevards

Bicycle boulevards are non-arterial streets that are designed to allow bicyclists to travel at a consistent, comfortable speed along non-arterial roadways and to cross arterials conveniently and safely. This is achieved by introducing treatments that slow or divert motorists while allowing bicyclists to travel along the bicycle boulevard with minimal stopping. Traffic calming and traffic management treatments such as traffic circles, chicanes, and diverters are used to prevent motor vehicles from speeding and using the bicycle boulevard as a cut-through. Quick-response traffic signals, median islands, or other crossing treatments are provided to facilitate bicycle crossings of arterial roadways. Bicycle boulevards are marked with a bicycle pavement symbol and the words “BIKE BLVD”.

CALL-OUT BOX: “Streets with a series of traffic calming features work well as bike routes. Cars have to slow down to bicycle speed.”

Multi-Purpose Trails

Multi-purpose trails (also referred to as shared-use paths) are an important component of Seattle’s bicycle transportation system. These facilities can provide a high-quality bicycling experience because they are separated from motor vehicle traffic and often provide an opportunity for extended landscaping and territorial views of the City. Multi-purpose trails can be paved and should be a minimum of ten feet wide. Minimum width may be reduced to eight feet where physical or right-of-way constraints are severe. Trail widths of 12-, 14-, and even 16-feet are appropriate in high-use urban situations.

Shared Roadways

Shared roadways are regular streets without any designated bicycle facilities. Many non-arterial roadways with low traffic volumes and low speeds are already excellent places for bicyclists to ride because they are quiet streets. Roadway striping and markings do not need to be provided to make them comfortable for most bicyclists to use. Many of Seattle’s arterial streets are also currently shared roadways, but appropriate facilities described above should be added to the arterials to make them more comfortable for bicycling.

Other Bicycle Facilities

Other bicycle facilities recommended for the Bicycle Facility Network include paved shoulders, wide outside lanes, shared bus/bike lanes, and bus/bike-only roadways.

Paved shoulders provide space on the outside of the roadway for bicycle and pedestrian use¹. There is no minimum width for paved shoulders, however a width of at least 4 feet is preferred. On some undeveloped roadways (many of which are in the far northern and southern parts of Seattle), paved shoulders can be provided to make important bicycle connections. In some locations, reconstructing the roadway with shoulders can also include pavement for an on-street parking lane or parking pockets. Paved shoulders also improve safety for motor vehicles and prevent pavement damage to the travel lanes.

¹ The City may consider testing new paving materials for roadways (including shoulders). These paving materials should be monitored to determine if any they are appropriate for bicycle facilities. While pervious and semi-pervious materials may be desirable, the selection of the material needs to be project-specific and based on analysis of traffic, local drainage, and other engineering factors. At this time semi-pervious materials used by the City are not appropriate for multi-use trails.

In locations where it is not feasible to add pavement at the edge of a roadway to create a paved shoulder, the City may consider experimenting with striping a dashed shoulder to identify the space where motorists should be prepared to see pedestrians and bicyclists. This treatment can be combined with traffic calming devices such as chicanes to encourage slower vehicular speeds. Motorists would share a 14'-18' center shared lane (typical on neighborhood streets with parking on both sides) while a 3'-5' shoulder on the edges would allow for motorist to pull aside to pass. This treatment would be appropriate for lower volume roadways that do not allow parking on or near the shoulder and do not have sidewalks for pedestrians.

Wide outside travel lanes are typically designed to be 13- to 15-feet wide. This width allows more separation between bicyclists and motor vehicles than more typical 10- to 12-foot wide travel lanes. Wide outside travel lanes on arterial roadways are generally acceptable for experienced cyclists, but the City does not encourage less-experienced bicyclists to use this type of facility. These travel lanes do not provide the benefit of having a striped area that is exclusively for the use of bicyclists, a feature that bicyclists with all levels of riding experience have reported as desirable. Wide outside lanes also do not have markings to indicate where bicyclists should be positioned when passing through an intersection with a right-turn lane.

- Bus/Bike Only Roadways
- Shared Bus/Bike Lanes

Due to limited opportunities and other considerations, this Plan recommends considering use of sidewalk facilities for bicycling in a limited number of specific locations. Special attention will be required in the design process to ensure user safety on sidewalks and sidepaths.

Sidewalks may be useful for bicycling for a number of reasons:

- Bicycle access is needed but bicycle volumes and/or pedestrian volumes are expected to be low.
- Right-of-way or traffic safety (high speeds, high volumes, lots of trucks) issues suggest that sidewalk use may be the only option or even preferred, especially if bicyclists are traveling up a steep hill. However, bicyclists should not travel faster than the speed of a typical jogger (5 to 10 miles per hour) if they use sidewalks.
- They can be designed to accommodate separated, one-way bicycling on each side of the road so that bicyclists can safely and easily transition to and from the road at each end of the segment. Sidewalk bike routes should not result in bicyclists riding opposed to motor vehicle traffic when they re-enter the street.

Sidepaths are essentially trails that are located on the side of a roadway. However, sidepaths are often located only on one side of a road and are intended to provide two-way bicycle and pedestrian travel. Sometimes this type of facility is the only option or is the safest option.

Sidepaths can function well if some of the following key design features can be achieved:

- Sufficient width is available to build a facility with at least a five-foot buffer between the outside travel lane and edge of pathway (3'6" barrier also acceptable).
- The path can be located in an area where conflicts with crossing roadways (which may or may not be signalized) can be minimized. Paths work particularly well where they are parallel to expressways and railroad rights-of-way because they are limited access in nature.
- Crossings of free flow ramps can be avoided, minimized or made sufficiently safe.

One type of facility that is not recommended in this Plan is a bicycle lane or path at the edge of an arterial roadway between parked cars and the curb. Several reasons for discouraging the use of this type of facility are provided under the description of bicycle lanes.

Further Study Required

There are a number of roadways that have poor conditions for bicycling, but do not have straightforward opportunities to stripe narrower lanes, remove lanes, add shoulders, or make other physical improvements due to right-of-way constraints and traffic volumes. Some of these roadways represent critical connections between major destinations in the Bicycle Facility Network. In order to make recommendations on how to make these roadways better for bicyclists, the City will need to conduct additional, detailed studies that are beyond the scope of this Plan.

Transitions Between Different Bicycle Facility Types

Due to existing roadway conditions, surrounding land uses, available right-of-way, and other characteristics, it is often necessary to use different bicycle facilities to provide bicycle access within the same bikeway corridor. It is important for the City of Seattle to provide safe transitions between different facilities (such as adding shared lane pavement markings and “SHARE THE ROAD WITH BICYCLES” signs when transitioning from a bicycle lane to a shared roadway). These transitions can be made safer and more understandable for bicyclists and motorists with appropriate treatments, such as spot directional signs, warning signs, pavement markings, curb cuts, etc. Transitions should be provided as a part of the bicycle facility design process.

Types of Facilities for Network Roadway Crossings

Roadway crossings are critical to the safety and convenience of the Bicycle Facility Network. Seattle has a number of multi-lane streets that carry high-speed, high-volume traffic, such as Aurora Avenue N and Rainier Avenue S. Many other arterial streets are also challenging to cross, particularly during peak travel periods. In order to make it possible for bicyclists to travel throughout the City, there must be safe places to cross these major streets. The section below describes the types of treatments that are recommended to help bicyclists cross these roadways. Selection of the appropriate roadway crossing treatment depends on a number of factors:

- Roadway width
- Motor vehicle traffic volumes
- Travel speed
- Sight-distance
- On-street parking
- Presence of traffic signals at the intersection or at nearby intersections
- Location on a signed bicycle route or bicycle boulevard

Roadway crossing facilities recommended for the Network are described below. Additional detail is provided in Appendix F: Guidance for Retrofitting Seattle Streets to Create Dedicated Bicycle Facilities and Appendix H: Roadway Crossing Design for Bicycles.

An appropriate combination of physical improvements is recommended for each crossing location. The types of physical improvements that are recommended are described below. There are four general categories of improvements:

- 1) Traffic signals
- 2) Geometric improvements
- 3) Signs
- 4) Paint

Full Traffic Signals

Full traffic signals allow bicyclists to cross arterial streets without needing to select an appropriate gap in moving traffic. Traffic signals make it easier to cross the street, though it is important to make bicyclists aware of potential conflicts with turning vehicles and make improvements to reduce these conflicts.

Considerations:

- Must meet MUTCD warrants
- Roadway approach volumes (all directions)
- Sight distance
- Crash history

Pedestrian Crossing Signals

Pedestrian crossing signals to allow pedestrians to stop traffic to cross arterial streets at key locations. These signals are beneficial for bicycle crossings. However, because they are oriented for pedestrians, the signals are provided on only one side of the non-arterial roadway, and the push-buttons for actuating the signal are adjacent to the sidewalk, out of reach of bicyclists in the roadway (see section below for recommended improvements to these signals).

In order to improve bicycle access, SDOT has established a policy to provide signals and crosswalks on both sides of non-arterial roadways at intersections with pedestrian crossing signals. The policy also restricts motorist movements at these intersections to left- and right-turns only to prevent cut-through traffic.

Considerations

- Must meet SDOT director's rule 04-01.
- Non-arterial street volume
- Gaps in arterial traffic
- Sight distance
- Crash history

Curb Extensions

Curb extensions shorten bicycle and pedestrians crossing distance (exposure time) and increase the visibility of non-motorized users at roadway crossings. By narrowing the curb-to-curb width of a roadway, curb extensions may also help reduce motor vehicle speeds and improve bicyclist and pedestrian safety. Curb extensions are only appropriate for locations that have on-street parking.

Considerations:

- Curb radius determined by turning design vehicle
- Parking must be allowed full time on arterial
- Sight distance
- Utilize where arterial turn pockets are required and median can not be provided

Curb radius reduction

Wide curb radii allow motorists to make high-speed turning movements. Reducing the curb radii at the corners of an intersection helps to slow turning vehicles, improves sight distance between bicyclists and motorists, and shortens the crossing distance for bicyclists and pedestrians. The choice of a curb radius is dependent on the design vehicle and speed; and whether the street is a local residential street, a neighborhood collector, or a major arterial. This requires a separate calculation to determine the appropriate radius for each corner of an intersection.

Median Islands

Median islands (or crossing islands) allow bicyclists and pedestrians to cross one direction of motor vehicle traffic at a time. Arterial roadway intersections that have low demand for left-turn movements can be potential candidates for adding median islands. Median islands can be constructed on these roadways by using the available center turn lane area or by removing parking from one side of the street and shifting the travel lanes. Median islands are likely to be a medium-term improvement on roadways where significant channelization changes are needed to provide enough space for the median island.

Considerations:

- Parking must be allowed full time on arterial
- Taper full width of parking
- Left turn volume limited will be limited on the arterial roadway--left-turning cars must wait in the middle of the intersection between medians
- Full closure of the median (rather than islands) prohibits left turns from the arterial street and through-movements on the non-arterial street

Arterial Speed Management

Traffic speeds on arterial streets can be managed by alternating the location of on-street parking from one side of the street to the other in different blocks and adding median islands at roadway crossings. Slower speeds improve conditions for walking and bicycling along the roadway and make it safer and easier for pedestrians and bicyclists to cross the roadway.

Considerations:

- Arterial must only have 2 lanes of traffic
- To create a shift in travel lanes, the arterial may have parking on one side of road that alternates sides or parking that alternates between parallel and back-in angle parking on a block-by-block basis
- Parking must be allowed full time on one side of road

Other potential forms of arterial speed management include parking management, road diets, lane narrowing, signage, medians, and speed cushions.

Overpasses and Underpasses

Overpasses and underpasses separate bicycle and pedestrian traffic from vehicular traffic, allowing bicyclists and pedestrians to cross freeways, busy streets and railroad tracks without potential conflicts. They can also be used to cross ravines, canals and streams. However, they should be used with great caution: they are expensive to construct; underpasses are prone to security concerns due to low visibility; and the inconvenience of out-of-distance travel is high, up to 1000 feet or more, because of the need to provide accessible ramps, pedestrians will not walk this extra distance and cross at-grade. To be effective, there often has to be a self-enforcing feature that requires the bicyclists or pedestrian to use the bridge, such as topography, or fencing. Consequently, they should be reserved for locations where there is a high demand for bicycle and pedestrian crossings and there are no other more attractive options. Adequate width (for users to pass each other comfortably), lighting, and surveillance should also be provided to increase security of these crossings.

Bike Box at Intersection

Bike boxes are installed to allow bicyclists to move in front of cars waiting at an intersection to increase their visibility and reduce conflicts with turning vehicles. They are typically used at intersections where bicyclists need to turn left and/or many vehicles turn right. During a red signal phase, bicyclists are able to better position themselves for a left turn by moving left across the bike box.

High-visibility pedestrian/bicycle crossing warning signs

High-visibility bicycle and pedestrian warning signs are recommended at trail crossings in Seattle. These signs can increase driver awareness of pedestrians and bicyclists, especially at mid-block locations where pedestrians and bicyclists may not be expected. These signs will be most effective when combined with other treatments, such as marked crosswalks, curb extensions, median islands, etc. Signs should be used judiciously—too many signs can cause visual clutter and lead to non-compliance. See Appendix H for additional guidance on right-of-way assignment and appropriate crossing treatments.

Sight-distance improvements

Sight-distance obstructions can increase the risk of bicyclist being struck by vehicles at roadway crossings. Several of the locations recommended for bicycle crossing improvements in Seattle have on-street parking, landscaping, light poles, bus stop shelters, and other features obstructing the line of sight between drivers and bicyclists. While these features can make a street more attractive and serve other valuable functions, they should be placed in locations that do not obscure drivers' views of bicyclists. The City should continue to make sight distance improvements through its Spot Maintenance Program.

Note that parking is already restricted within 30 feet of intersections and within 20 feet of a midblock crosswalk on arterial streets. However, consideration should be given to painting curbs red to designate these no-parking areas near intersections. Enforcement of this law should be improved on arterial roadways with bicycle lanes and at intersections where signed bicycle routes cross arterial roadways.

CALL-OUT BOX: “Please consider restricting street parking near intersections with heavily-traveled bike routes. Having good sight lines is critical to the safety of cyclists...”

APPENDIX F. GUIDANCE FOR RETROFITTING SEATTLE STREETS TO CREATE DEDICATED BICYCLE FACILITIES

The following guidance is to be utilized in conjunction with the City of Seattle Bicycle Master Plan (hereafter referred to as the Master Plan) to assist the Seattle Department of Transportation (SDOT) in the development of a connected bicycle network throughout the City. The Master Plan provides an overall planning and policy framework for future development of bicycle facilities in the City.

The Master Plan recommends a variety of facilities including off-road trails, on-road facilities for low-volume and low-speed neighborhood streets, and on-road facilities for higher-volume and higher-speed streets (Seattle's arterial streets). This guidance addresses the third category, Seattle's arterial streets. The guidance is aimed toward assisting the roadway engineer in determining if adding bicycle lanes are feasible, and providing guidance for retrofitting streets in constrained situations where other types of on-road facilities may be more appropriate. The Master Plan developed specific cross sections for more than 250 miles of arterial roadway segments in the Bicycle Facility Network through a planning-level analysis of Seattle roadways. Detailed descriptions of the bicycle facility types used in these cross sections are in Appendix D. The Master Plan proposes minimum-width configurations that may be permissible depending on roadway characteristics. Implementing some of these facilities will require a change to the existing roadway configuration.

This guidance is provided as a tool to help the designer accomplish the following tasks:

- review the recommended cross section set forth in the Master Plan
- optimize the final proposed cross section dimensions
- develop an optimum cross section for roadway segments not included within the Master Plan
- obtain the necessary City, State, and Federal approvals for the design (as appropriate)

Bicycle Facility Decision-Making Process

Table F-1 illustrates the decision-making process that a designer should follow to develop an optimal bicycle facility recommendation for any arterial roadway in Seattle. This table focuses on selecting the optimal cross section for providing bicycle access, given roadway and traffic characteristics. Intersection considerations are discussed later in this guidance, but are not included in the table. Below is a description of the decision-making process shown in Table F-1.

Target Bicycle Facility Type

Identify a potential cross section for the roadway that includes a bicycle lane (or other target bicycle facility type). This desired roadway cross section would include facilities for all travel modes, as necessary, and would adhere to all relevant guidelines (see Bicycle Facility Design Guidelines discussion).

Analysis

Analyze the roadway to determine feasible cross sections for bicycle facilities, given existing roadway and traffic characteristics. There are two main steps in the analysis phase. First, the designer should consider which elements of the existing roadway could potentially be

modified to provide space for the target bicycle facility. The following questions should be asked:

- Can the existing pavement be widened, or can the curbs be moved?
- Can any existing lanes be removed (consider travel lanes, center-turn lanes, and parking lanes)?
- Can any existing lanes be narrowed?

Second, the designer should consider factors that affect the potential to modify the roadway in any of the three ways listed above. These factors include:

- Roadway capacity
- Traffic volume and speed
- Roadway grade
- On-street parking demand
- On-street parking turnover
- Heavy vehicle traffic (Trucks and Buses)

Analysis is critical for selecting an optimal bicycle facility. This phase is discussed in greater detail in the remaining sections of the document.

Alternatives

Identify several alternative cross sections for providing bicycle access in the roadway corridor, based on the recommended bicycle facility in the Master Plan and other options identified during the analysis phase. A bicycle facility recommendation has been developed for more than 250 miles of arterial roadways in Seattle through the Master Plan process. This recommendation is based on a preliminary field assessment of bicycle network connectivity and feasibility, and (where available) should be the first bicycle facility alternative considered for the roadway. However, alternatives identified in the analysis phase should also be considered.

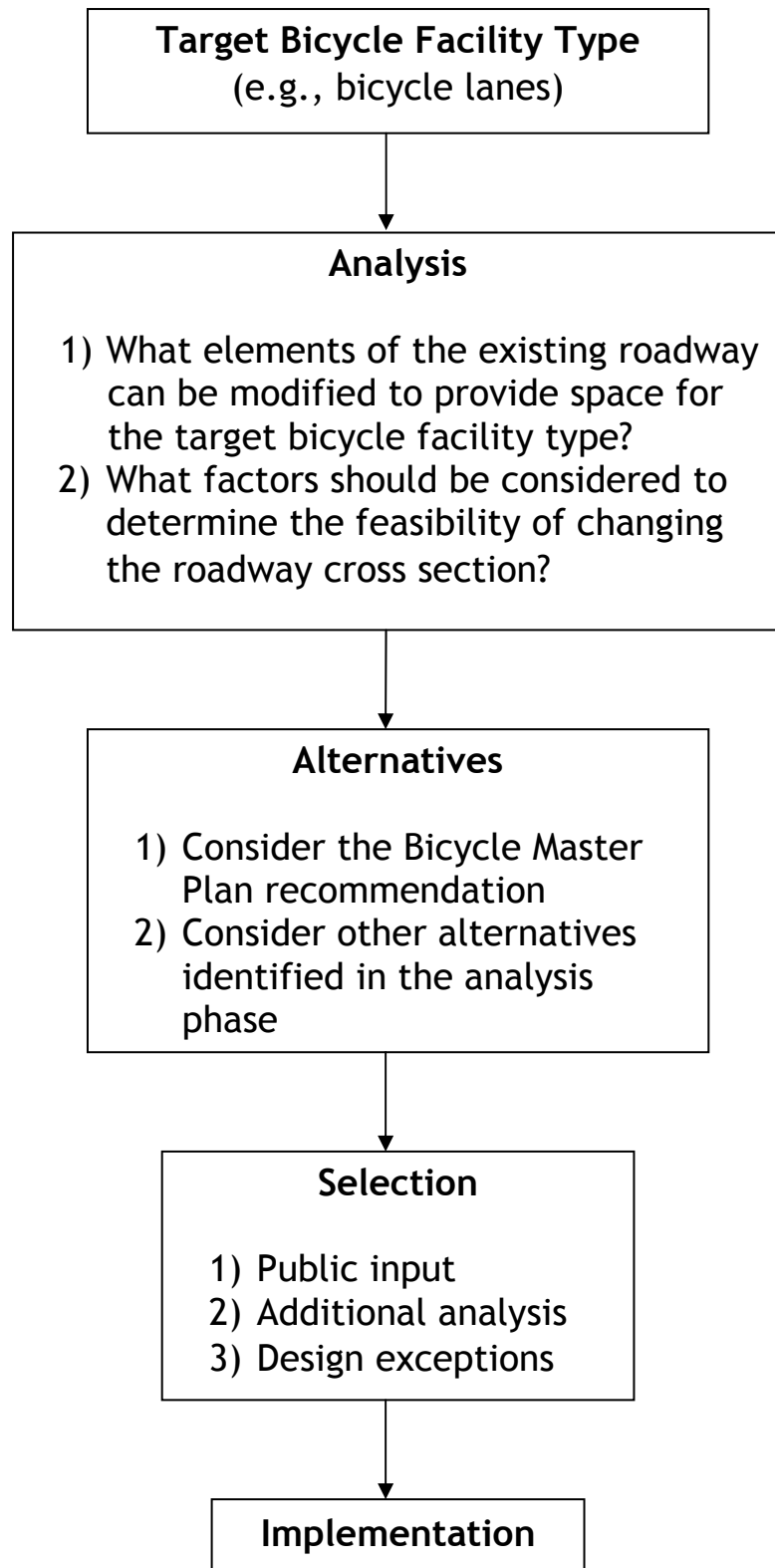
Selection

Obtain public input on several alternative bicycle facility cross sections. Public input may make it necessary to conduct additional analysis. Identification of design exceptions should be made during this phase, if necessary. If design exceptions are not likely to be approved, different alternatives should be chosen.

Implementation

Implement the optimal bicycle facility identified through this decision-making process.

Table F.1. Bicycle Facility Decision-Making Process



Bicycle Facility Design Guidelines

While the goal of this document is to help designers develop roadway designs that meet all of the requirements set forth by city, state, and federal guidance, it is understood that there is a need to allow flexibility to develop safe and efficient roadway designs that serve the widest range of users. This need is acknowledged in both the Washington State Department of Transportation (WSDOT) Design Manual and in the Seattle Right-of-Way Improvement Manual (ROWIM)¹. Both documents provide a detailed explanation of the required design deviation process². It is likely that design deviations will be required to implement some bicycle facilities.

This guidance is a supplement to national bicycle and roadway facility planning and design guidelines. When using this guidance, the designer is encouraged to consult the following documents:

- AASHTO *Guide for the Development of Bicycle Facilities*, 1999
- *Manual on Uniform Traffic Control Devices*, 2003
- City of Seattle Right-of-way Improvement Manual (ROWIM)
- Washington State City and County Design Standards for the Construction of Urban and Rural Arterials and Collectors
- *A Policy on Geometric Design of Highways and Streets* (Green Book), 2004, AASHTO
- *Standard Plans for Road, Bridge, and Municipal Construction* (Standard Plans), WSDOT, M 21-01
- Washington State Design Manual, WSDOT, M22-01 *[Comment - Should we also reference: Right-of-Way Manual, WSDOT, M26-01?]*

This guidance is not a design standard, and should not be used as such. Application of this guidance requires the use of engineering judgment when retrofitting Seattle streets to provide optimal bicycle facilities.

Target Bicycle Facility Type

Since geometric and land use conditions vary frequently from location to location, this guidance provides key design considerations for each type of roadway cross section to help identify opportunities to alter elements of the cross section to develop safe and efficient roadway designs that serve the widest range of users. In most situations where the goal is to provide an on-road bicycle facility on an arterial roadway in Seattle, the target facility type is a bicycle lane.

Analysis of Roadway and Traffic Characteristics to Determine Bicycle Facilities

The initial part of the analysis process is to develop a theoretical desired cross section taking into account cross section elements and the design factors mentioned above, and determining if that section will fit within the existing roadway width. If the existing roadway can not accommodate the desired cross section, consideration should be given to roadway widening. When considering potential widening, estimated project costs, and impacts to properties and

¹ WSDOT Design Manual, June 2005, Forward; ROWIM, Section 1.1

² WSDOT Design Manual, Chapter 330; ROWIM, Section 2.6

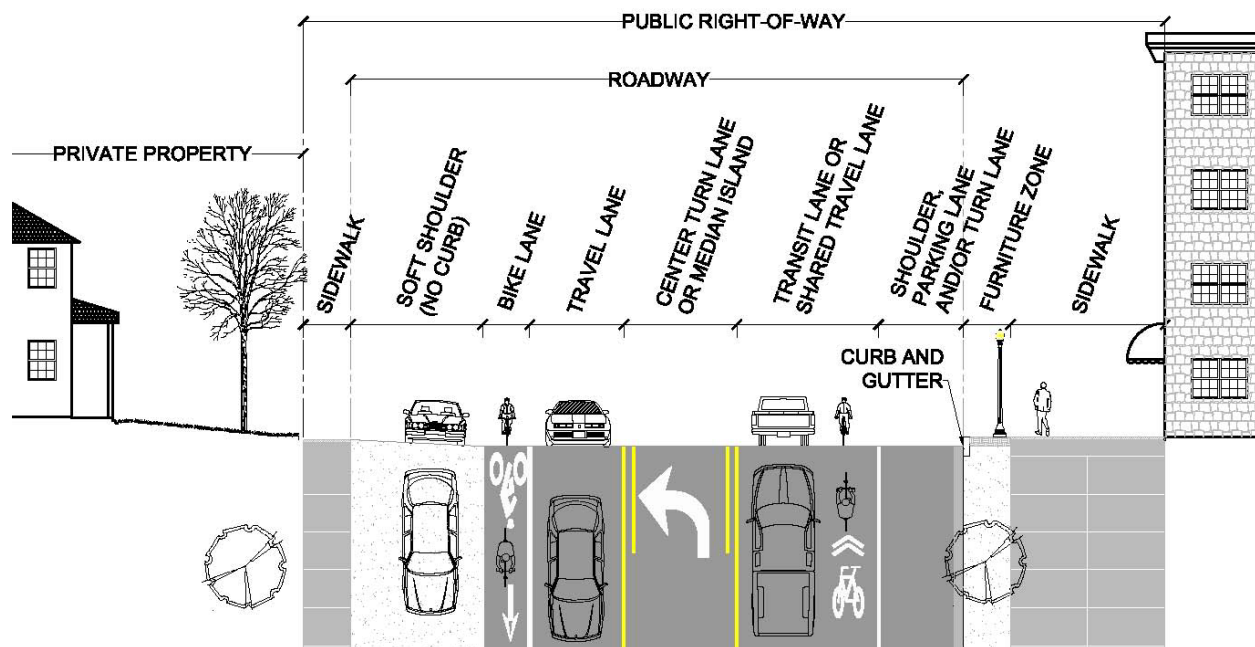
utilities should be evaluated. Careful consideration should also be given to potential impacts to pedestrian facilities. Reductions in sidewalk width below 5' and reductions or elimination of the buffer between the road and a sidewalk are not advisable. In locations with higher pedestrian volumes, sidewalks wider than 5' are needed. In most situations roadway widening is ruled out due to a combination of the above impacts. Therefore, the remainder of this guidance deals with retrofit projects, i.e. projects that are constrained by the existing paved or curb to curb widths.

Analysis is critical for selecting an optimal bicycle facility. As shown in Table F-1, the analysis phase in the bicycle facility decision-making process involves two main steps. First, the designer should consider which elements of the existing roadway could potentially be modified to provide space for bicycle facilities. Second, the designer should consider factors that affect the potential to modify the roadway. The details of these steps are discussed below.

Roadway Cross section Elements

While the discussion focuses on changes that will provide better bicycle access within the roadway, the needs of bicyclists must be balanced with other roadway users within the context of the roadway as a component of Seattle's multi-modal transportation system. Individual roadway cross section elements can either be added or removed or the cross section elements can change dimensions (see Figure F-1, below). These changes must adhere to roadway engineering guidelines. As previously stated, this guidance primarily deals with retrofit projects, therefore cross section elements outside of the existing paved or curb to curb width are not addressed.

Figure F-1. Example Roadway Cross Section Elements



Note: roadways without curb and gutter may have swales or ditch drainage.

Travel Lane

Seattle streets are classified as arterials or non-arterials (neighborhood streets). The non-arterials are generally lower volume roadways with pavement widths varying between 20' and 40'. Centerline striping is not provided on non-arterials and bicycles most commonly share the travel way with motor vehicles.

The following discussion relates to roadways classified as arterials.

Design Criteria:

ROWIM³: Through traffic lane - 11 feet
Curb lane - 12 feet
Bus only lane - 12 feet
Wide outside lane (vehicle/bicycle) - 14 feet

Wash DOT: 11 feet min; varies based upon speed and road classification

AASHTO: 10 feet minimum; 11-12 feet preferred in urban areas⁴

Design Considerations: AASHTO provides flexibility in the establishment of lane width by discussing the merits of reduced lane width for interrupted-flow operating conditions and constrained conditions. AASHTO also states that “local practice and experience regarding lane widths should also be evaluated.”⁵ The consideration of narrow travel lanes should also take into account truck and bus volumes.

Bicycle Lane

Design Criteria:

Curb or adjacent to parking:

ROWIM - 5 feet, min.

WSDOT - 5 feet, min.

AASHTO - 5 feet, min.

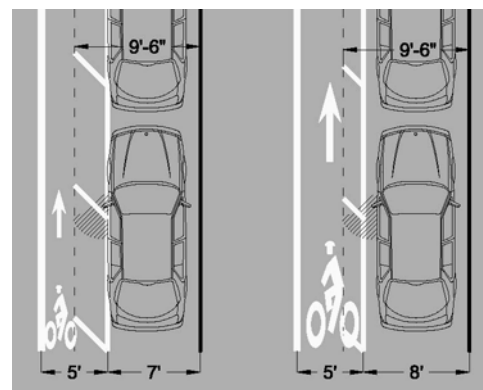
No curb or parking:

ROWIM - 4 feet, min.

WSDOT - 4 feet, min.

AASHTO - 4 feet, min.

Design Considerations: The minimum width for a bicycle lane adjacent to parking lane is 5'. A bicycle lane adjacent to the edge of the road without a curb may be 4' in width. Bicycle lane stripes are recommended to be 6-inch-wide solid white line. In locations with on-street parking, two stripes should be used to define a bicycle lane: one stripe on the travel-lane side, and one stripe on the parking-lane side of the bicycle lane. These stripes should be dashed in areas where motorists can be expected to merge across the bicycle lane. The design of bicycle lanes wider than 6' should be carefully considered as they can appear to be



Buffered Bicycle Lane

³ ROWIM - 4.6.2 Design Criteria

⁴ AASHTO Green Book, 2004, pg. 472

⁵ AASHTO Green Book, 2004, pg. 473

vehicular travel lanes to motorists.

A buffered bicycle lane can encourage bicyclists to ride away from the opening doors of parked vehicles by adding pavement markings to the bike lane. This treatment could be particularly useful to delineate the dooring area where:

- Bicycle lanes are adjacent to 7- or 8-foot parking
- Bicycle lanes adjacent to high turnover parking
- Locations of dooring complaints or crashes

Buffered bicycle lanes may also be considered on steep roadways where higher bicycle speeds can be expected and where more severe dooring crashes can be expected. Buffered bicycle lanes may be accompanied by signs reminding drivers to look for bikes when opening their doors.

Shared Travel Lane⁶

Shared travel lanes are distinctive from travel lanes because they include shared lane markings (SLM) within the travel lane. Shared lane markings are typically applied in constrained locations where bicycle lanes are not feasible.

Design Criteria:

Shared travel lanes follow the same design criteria as travel lanes. A shared travel lane shall be marked by a shared lane marking (from the ROWIM, figure 4-18). If adjacent parking is present, the marking shall be located 12' from the curb for a 10' to 12' travel lane, and 11' from the curb for a travel lane 13' or greater. In locations where the travel lane is adjacent to curb or roadway edge, the center of the marking is placed 4' from the curb or edge.

Design Considerations:

It is desirable to have a shared travel lane be a wide outside lane of 12' to 14'. Shared travel lanes should be considered for the following situations:

- On constrained roadways that are too narrow to stripe bicycle lanes
- To delineate space within a wide outside lane where bicyclist can be expected to ride
- On multi-lane roadways where bicyclists can be expected to travel within the outside lane and motorists should be prepared to change lanes to pass bicyclists
- On roadways where it is important to increase motorist awareness of bicyclists
- On roadways where bicyclists frequently ride the wrong way
- On roadways where bicyclists tend to ride too close to parked cars

Center Turn Lane

Center turn lanes can be utilized to remove turning vehicles from the through travel lanes. This can improve roadway capacity and potentially allow for fewer through travel lanes.

Design Criteria:

AASHTO -10-16 feet⁷

Design Considerations: The width of the center turn lane should be based upon traffic volume. Careful consideration should also be given to the determination



⁶ For further discussion on the shared lane marking treatment, read the Shared Lane Bicycle Pavement Marking Memorandum located in Appendix N of the Bicycle Master Plan.

⁷ AASHTO Green Book, 2004, pg 338

of whether a continuous center turn lane is more advantageous than a dedicated left turn lane. For roadways with lower volume turning movements it may be more beneficial to provide medians or crossing islands and dedicated left turn pockets. AASHTO recommends the use of an 11' width for continuous two-way left turn lanes.

Dedicated Turn Lane

Similar to center turn lanes, dedicated turn lanes can be utilized to remove turning vehicles from the through travel lanes to improve roadway capacity and potentially allow for fewer through travel lanes.

Design Criteria:

ROWIM: 12 feet
Wash DOT: 11 feet min; varies based upon speed and road classification
AASHTO - 9 feet min. (arterial design speed less than 40 mph)⁸

Design Considerations: The width of the turn lane should be based upon traffic volume and speed. Careful consideration should also be given to the determination of the length of the turn lane as it is often necessary to drop bicycle lanes or narrow travel lanes to install a dedicated turn lane. Bicycle lanes should be dropped up to 100' prior to dedicated turn lanes or if bicycle lanes are present, they shall be located to the left of right turn lanes and to the right of left turn lanes.

Parking Area

Design Criteria:

ROWIM: 8 feet⁹ minimum
10 feet on a bus route
WSDOT: 8 feet
AASHTO: 7 feet minimum (non-arterial streets primarily accommodating passenger vehicles)
8 feet minimum (arterial)
10-12 feet¹⁰ (for use as possible through lane)

Design Considerations: The use of 7' parking adjacent to bicycle lanes or wide outside lanes in lieu of the 8' minimum may be an option where space is constrained. The addition of a bicycle lane or a wider outside lane alleviates the primary AASHTO concern of sideswiping. Research¹¹ has found that parked vehicles can be held closer to the curb or edge of the roadway with the use of a 7' striped parking line.

If bus bulbs are installed in the parking area for in-lane bus stops on express routes, they would be infrequent. Bicycle lanes can still be provided on these streets, but would be discontinuous at the express bus stop. Appropriate warning signage and markings would be provided for bicyclists and motor vehicle operators at these locations.

Some streets in Seattle have a soft surface area located adjacent to the roadway that allows parking. Soft surface areas where parking is allowed that are narrower than 7' should be widened or parking should be restricted to improve safety along a roadway. If parking is

⁸ AASHTO Green Book, 2004, pg 478

⁹ This would require a ROWIM policy change to allow for 7-foot parking on all bicycle routes.

¹⁰ AASHTO, pg. 478

¹¹ Cite Ron Van Houten Research

allowed, an edgeline should be installed to encourage motorists to park off from the roadway. The roadway edgeline stripe is recommended to be 4-inch-wide solid white line. The designer should consider the following options in locations where parked vehicles continue to encroach on the travel way:

- increase the edgeline (parking line) width to 6-inches
- provide parking regulation signs notifying drivers to park off the traveled way
- reconstruct the shoulder with curb and gutter to define parking area

Shoulders

Soft surface shoulders are located adjacent to a number of roadways in Seattle. Soft shoulder areas provide an opportunity for improvements to the roadway cross section, but can create sub-optimal conditions for bicyclists in certain situations.

Design Criteria:

ROWIM: 5 feet (non arterial¹²)
WSDOT: 8 feet (parking allowed)
AASHTO: varies

Design Considerations: Shoulders that have a poorly-maintained pavement edge are not desirable for bicyclists operating close to the edge of the roadway (a common practice for bicyclists riding on roadways with narrow travel lanes).

Elimination or reduction of the shoulder may be considered under the following circumstances:

- To provide space for an enhanced bicycle facility (wider travel lane or bicycle lane)
- In locations where there is excess parking capacity
- In locations where the shoulder is greater than 7' in width

If a shoulder is designated as a bicycle lane, it must be at least 4' wide.

Factors that should be Considered when Selecting Bicycle Facilities

Many of the factors previously mentioned (e.g., capacity, traffic volume and speed, on-street parking turnover, heavy truck volumes, etc.) are taken into consideration when determining an optimal cross section for a retrofit project. The relationship between these factors and cross section elements is a key step in the analysis process to determine an optimal cross section. Capacity, speed, volume, heavy vehicles, grades, and parking directly relate to the need for, and dimension of cross section elements. These factors are further discussed below to provide guidance to the designer to achieve increased modal balance within the constrained cross section, and provide the best possible bicycle facility.

Roadway Capacity

Roadway capacity is considered when examining the number and type of vehicular travel lanes. If a reduction in the number of travel lanes is desired, a traffic analysis should be performed to determine if that option is feasible.

Traffic Volume and Speed

Roadways with higher vehicular speed and volumes are less comfortable for cyclists, and are therefore in more need of dedicated bicycle facilities. Excess capacity can also result in

¹² ROWIM- Section 4.6.2

higher traffic speeds. Some roads may benefit from the fewer travel lanes or conversion of travel lanes to turning lanes. Reducing traffic volume and/or speed can also allow for the installation of narrower travel lanes and turn lanes.

Heavy Vehicles

Heavy vehicles (trucks and buses) may require additional operating space on roadways. Additionally, frequent passing of bicyclists by heavy vehicles in a narrow cross section may create conflicts. The AASHTO Guide cites “if substantial truck traffic is anticipated, additional lane width may be desirable.”¹³ The use of travel lanes below 11’ is not recommended on streets with a high percentage of heavy vehicles. This guidance recommends a threshold of 10% of the ADT or greater.

Road Grade

Road grade has the largest affect on bicyclist operating speed. On steep ascents, bicyclists may be slowed to the speeds of pedestrians. On steep descents, bicyclists may exceed motor vehicle speeds. On constrained rights-of-way the designer can accommodate a bicyclist in a narrower cross section by utilizing a climbing bicycle lane in the uphill side of the road. On downhill sections that bicyclist can be directed to share the lane with motorist. This can reduce the total width required for the roadway cross section. Careful consideration should be given to placing bicycle lanes adjacent to parking on portions of roadways with steep descents (See Bicycle Lane discussion).

On-Street Parking Demand

Providing ample on-street parking is often considered an important need by the general public, and efforts to reduce or eliminate it can be met with strong opposition. However, the reduction or elimination of parking should be considered in areas where bicyclists are constrained to riding too close to parked vehicles or where enhanced bicycle facilities are desirable. In locations where there is excess parking capacity, consideration should be given to the following options:

- consolidate parking to one side of road
- remove parking completely where there is no demand or sufficient off street capacity
- remove parking temporarily where there is a need for additional throughput capacity (i.e. - peak hour bike lane, bus lane, and/or travel lane)

On-Street Parking Turnover

High parking turnover can affect the safety of all roadway users. The bicyclist is typically the most vulnerable roadway user because they often ride adjacent to parked vehicles. When riding within the area of an opening door, the bicyclists is in danger of being struck and injured. Existing law¹⁴ requires a motorist to not open a door into moving traffic; nonetheless, the designer should consider this potential hazard in the design process. To reduce the impact of dooring the designer may consider reducing or eliminating parking, providing a buffered bicycle lane or adding dooring warning signs (See Bicycle Lane discussion).

¹³ AASHTO Green Book, 2004, Pg 476

¹⁴Washington Code §46.61.620. Opening and closing vehicle doors – “No person shall open the door of a motor vehicle on the side adjacent to moving traffic unless and until it is reasonably safe to do so and can be done without interfering with the movement of other traffic, nor shall any person leave a door open on a side of a vehicle available to moving traffic for a period of time longer than necessary to load or unload passengers.”

Bicycle Facility Continuity Considerations at Intersections

Continuity of bicycle facilities at intersections takes into consideration the cross section elements and design factors mentioned above. Intersection treatments may vary depending on the approaching cross section. Conversely, bicycle treatments at closely spaced intersections may determine the cross section between nodes. Under ideal circumstances a standard bicycle lane would be accommodated at the approach to an intersection. However, with the frequent need for dedicated turn lanes at intersections, the roadway cross section can become constrained. The following designs offer options for accommodating bicycles in these constrained locations.

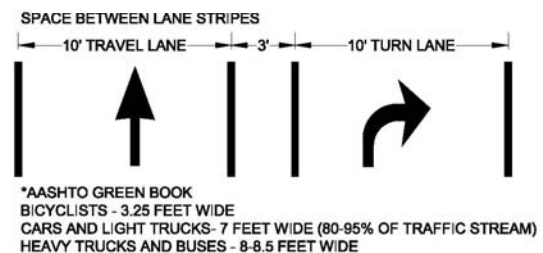
Pocket Lane

Pocket lanes are used when there isn't sufficient space to install a bicycle lane at the approach to an intersection. Pocket lanes provide for a continuous

bicycle facility through an intersection. They can encourage motorists to drive more slowly, and maintain a consistent traveling path. The striped pocket lane encourages through-moving bicyclists to stay to the left of right turning vehicles, and the lane enables bicyclists to bypass stopped vehicles. Pocket lanes should be a minimum of 3' in width and should not be marked as bicycle lanes (e.g., should not include the bicycle symbol pavement marking). Pocket lanes are not recommended on roadways with high speeds or high heavy vehicle volumes (10% of ADT or greater). This policy is considered experimental and it is recommended that Seattle conduct additional experimental studies before widespread implementation.



Pocket Lane Striping, Berkeley, California



Shared Bicycle/Right Turn Lane

Shared bicycle/right turn lanes are used when there isn't sufficient space to install a bicycle lane at the approach to an intersection. The shared bicycle/right turn lane encourages bicyclists to remain to the left of right turning traffic by striping a dashed bicycle lane through the right turn lane. They maintain the visual continuity of the bicycle lane while still allowing adequate shared space for bicycles and turning vehicles. A shared lane marking may be placed on the left side of a right turn lane to indicate that this space should be shared between through bicyclists and right-turning vehicles in lieu of providing the dashed striping.

Generic Examples of Roadway Cross Sections

The following graphics depict common City of Seattle roadway cross sections. Each of the cross sections is uniquely lettered to correspond to the cross sections recommended in the Master Plan (see Figure F.2. Cross Section Map). The basic cross sections are identified by a single letter. Variations of these basic cross sections are identified with a number following the letter. Each cross section includes additional considerations that should supplement the considerations that have already been discussed earlier in the document.

Figure F.2. Cross Section Map

As previously stated, the cross sections are based on a planning level analysis and that generally ruled out a widening option. Therefore the cross sections are geared toward minimum widths that may be permissible. As projects move toward implementation, the designer is encouraged follow the process outlined above and to utilize the standard reference documents. The designer should also consider the example variations (letter followed by number) when developing cross section alternatives. For example the minimum-width recommendation for roadways with 2 travel lanes, 2 bicycle lanes, and 1 lane of parking is cross section F. As additional variables such as soft shoulder parking or additional road width become available for that cross section, alternative striping patterns are detailed as permutations F-1, and F-2.

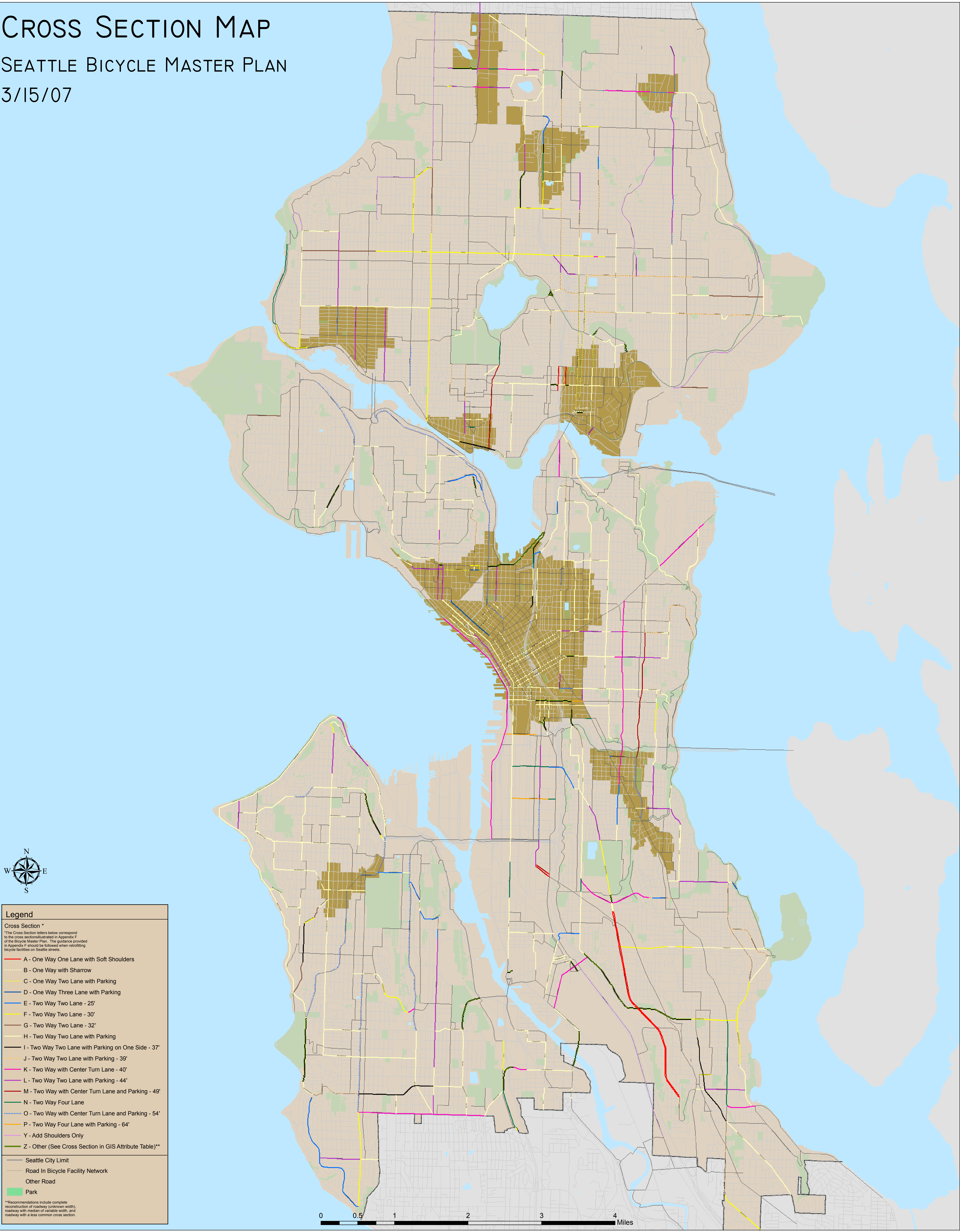
In addition to the design process outlined above, final design will require field confirmation of the following elements to assure a complete understanding of the existing conditions:

- parking
- roadway width
- curb presence and location
- drainage
- bus stop locations and lengths
- any other situation that may affect the implementation of a desired cross section, such as pavement condition, reversible or variable traffic patterns, etc.

CROSS SECTION MAP

SEATTLE BICYCLE MASTER PLAN

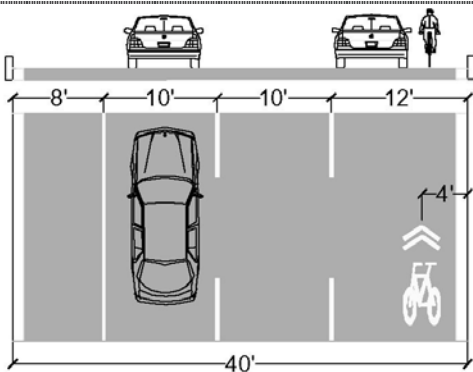
3/15/07



Constrained Cross Sections

	<p>A</p> <p>One Way One Lane with Soft Shoulders – 22'</p> <p>Additional Considerations</p> <ul style="list-style-type: none"> • If parking allowed on shoulder - width of shoulder should equal or exceed 7 feet
	<p>B</p> <p>One Way Two Lane with Parking – 34'</p> <p>Additional Considerations</p> <ul style="list-style-type: none"> • It may be advisable to place the shared lane marking in the left lane if the predominant flow of bicycle traffic is in the left lane
	<p>C</p> <p>One Way Two Lane with Parking – 39'</p> <p>Additional Considerations</p> <ul style="list-style-type: none"> • It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover • On steep descending grades, it may be more appropriate to utilize a shared travel lane in place of a bicycle lane
	<p>C-1</p> <p>Alternative One Way Two Lane – 42'</p> <p>Additional Considerations</p> <ul style="list-style-type: none"> • It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover • On steep descending grades, it may be more appropriate to utilize a shared travel lane in place of a bicycle lane

C-2

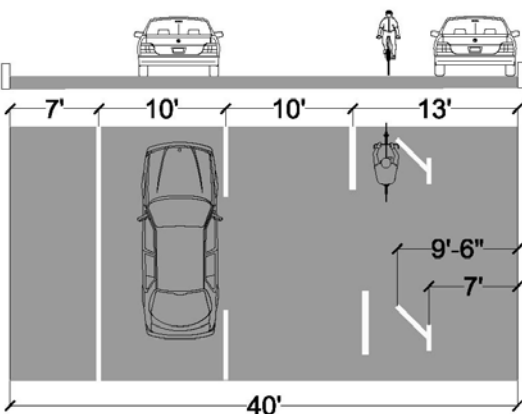


One Way Three Lane – 40'

Additional Considerations

- If parking allowed in right curb lane, the shared lane marking should not be utilized
- If parking is allowed and restricted - utilize design C-3 instead
- For use of shared lane markings (SLM), see discussion of considerations in this document and in Appendix N

C-3

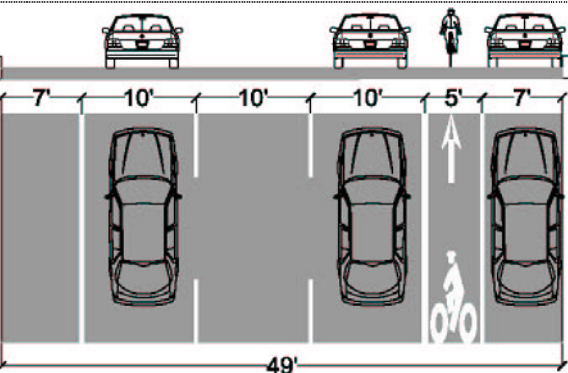


One Way Two Lane with Peak Hour Restrictions – 40'

Additional Considerations

- This should only be utilized on roadways where parking is restricted in the curb parking lane during rush hour
- The frequency of the tee marking is experimental. It is suggested that the spacing be no more than every 30 feet, with 15 feet as a minimum spacing

D

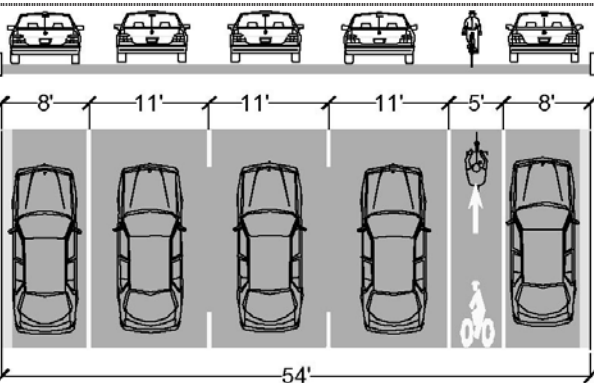


One Way Three Lane with Parking – 49'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- On steep descending grades, it may be more appropriate to utilize a shared travel lane in place of a bicycle lane

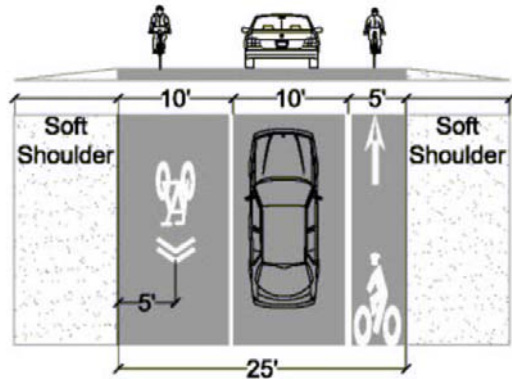
D-1



Alternative One Way Three Lane with Parking – 54'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- On steep descending grades, it may be more appropriate to utilize a shared travel lane in place of a bicycle lane

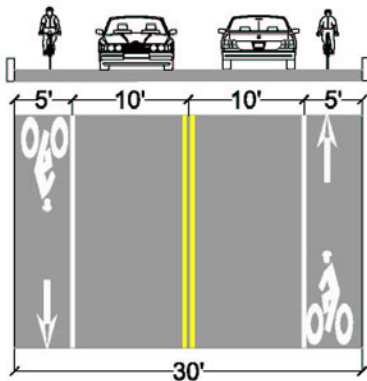


E

Two Way Two Lane – 25'

Additional Considerations

- If parking is allowed on soft shoulder - width of the soft shoulder should equal or exceed 7 feet
- The bicycle lane should be placed on the uphill portion of the roadway
- For use of SLM, see discussion of considerations in this document and in Appendix N
- Equal dimensioned shared lanes are preferred over bicycle lanes on flat sections of roadway (see example E-1)

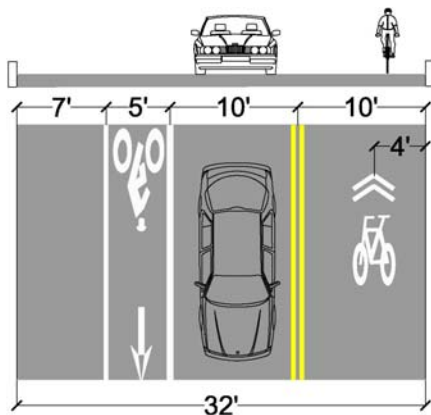


F

Two Way Two Lane – 30'

Additional Considerations

- If the roadway has no curb and parking is allowed on a soft shoulder - width of the soft shoulder should equal or exceed 7 feet

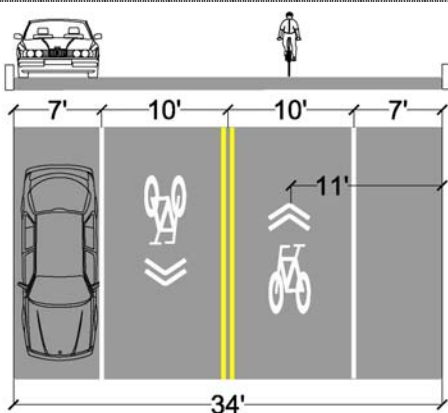


G

Two Way Two Lane with Parking – 32'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- The bicycle lane adjacent to parking should be placed on the uphill portion of the roadway
- For use of SLM, see discussion of considerations in this document and in Appendix N
- Equal dimensioned shared lanes are preferred over bicycle lanes on flat sections of roadway (see example H-1)

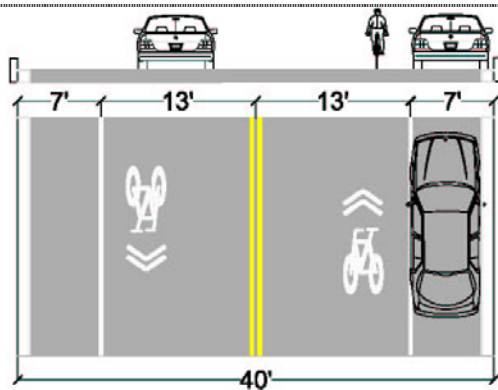


H

Two Way Two Lane with Parking – 34'

Additional Considerations

- Insufficient space to achieve bike lane, use shared lane marking
- For use of SLM, see discussion of considerations in this document and in Appendix N

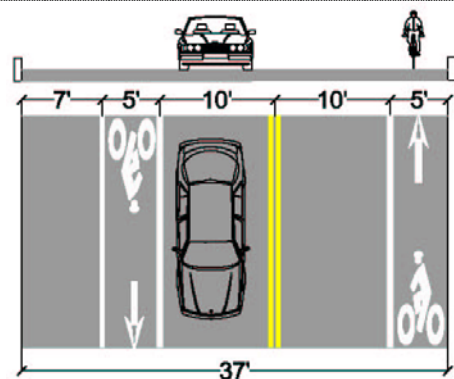


H-1

Two Way Two Lane with Parking – 40'

Additional Considerations

- For use of SLM, see discussion of considerations in this document and in Appendix N
- Climbing lanes are preferred over shared lanes on hilly sections of roadway - see example H
- On flat sections of roadway, this cross section is preferred over climbing lanes (H).

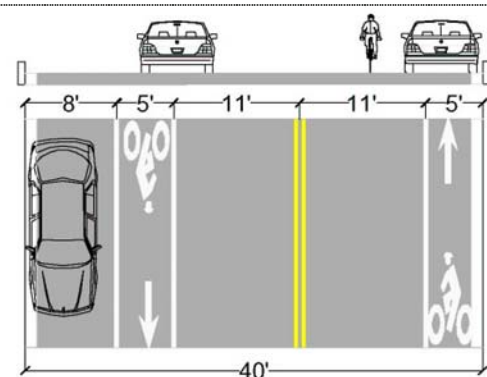


I

Two Way Two Lane with Parking on One Side – 37'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- The bicycle lane should be placed on the uphill portion of the roadway
- It is preferable to locate parking on the uphill side of the roadway (unless this would cause a significant increase in pedestrian crossings)

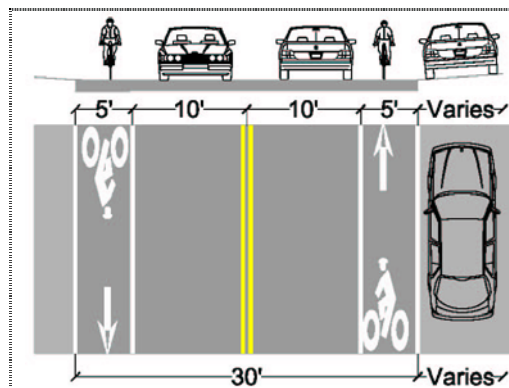


I-1

Two Way Two Lane with Parking on One Side – 40'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- The bicycle lane adjacent to parking should be placed on the uphill portion of the roadway
- If the roadway has no curb and parking is allowed on a soft shoulder - width of the soft shoulder should equal or exceed 7 feet

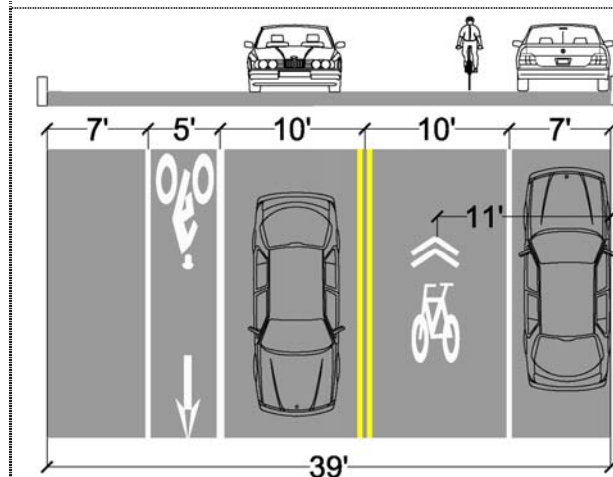


I-2

Two Way Two Lane with Soft Shoulders

Additional Considerations

- If parking allowed on shoulder - width of shoulder should equal or exceed 7 feet

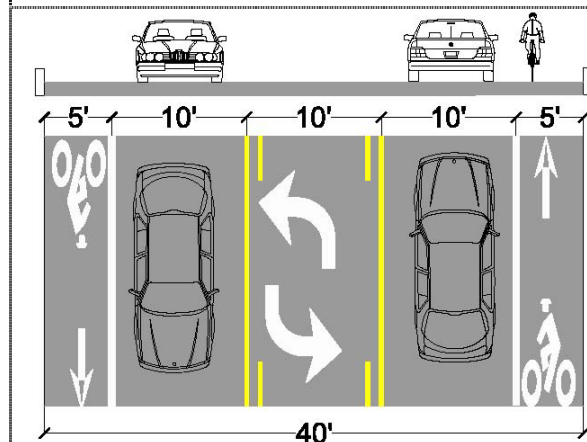


J

Two Way Two Lane with Parking – 39'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- The bicycle lane adjacent to parking should be placed on the uphill portion of the roadway
- For use of SLM, see discussion of considerations in this document and in Appendix N
- Equal dimensioned shared lanes are preferred over bicycle lanes on flat sections of roadway (see example H-1)

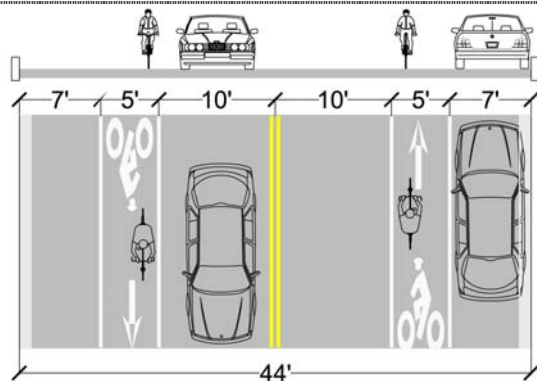


K

Two Way with Center Turn Lane – 40'

Additional Considerations

- The use of a 10' center turn lane should be avoided on roadways with high volumes of turning heavy vehicle traffic
- If the roadway has no curb and parking is allowed on a soft shoulder - width of the soft shoulder should equal or exceed 7 feet

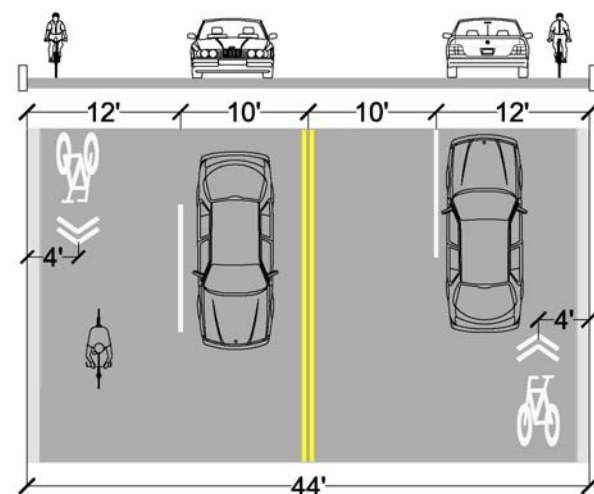


L

Two Way Two Lane with Parking – 44'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- It may be advisable to utilize a shared travel lane in locations with high parking turnover on steep grades

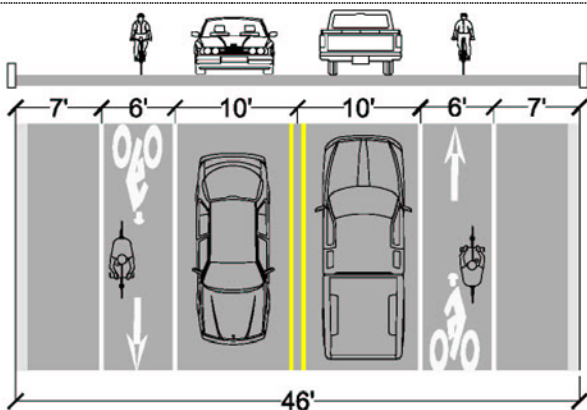


L-1

Two Way Four Lane– 44'

Additional Considerations

- If parking allowed in right curb lane, the shared lane marking should not be utilized
- If parking is allowed and restricted - utilize design C-3 instead
- For use of SLM, see discussion of considerations in this document and in Appendix N



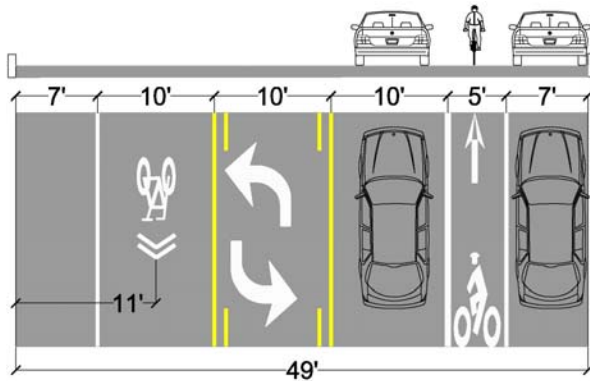
L-2

Two Way Two Lane with Parking – 46'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- It may be advisable to utilize a shared travel lane in locations with high parking turnover on steep grades
- The narrow travel lanes may be appropriate in locations that require additional traffic calming
- On truck or bus routes, it may be advisable to utilize 11' travel lanes and 5' bicycle lanes

M

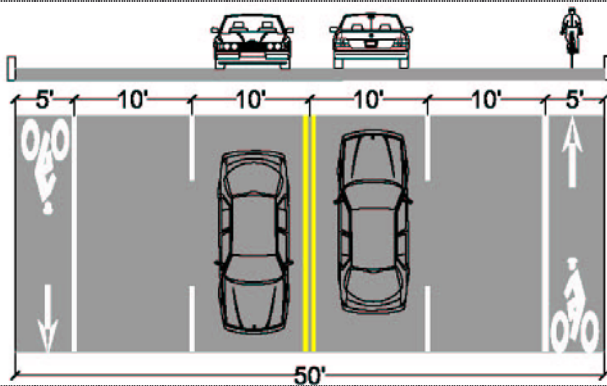


Two Way with Center Turn Lane and Parking – 49'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- The bicycle lane adjacent to parking should be placed on the uphill portion of the roadway
- The use of a 10' center turn lane should be avoided on roadways with high volumes of turning heavy vehicle traffic
- For use of SLM, see discussion of considerations in this document and in Appendix N
- Equal dimensioned shared lanes are preferred over bicycle lanes on flat sections of roadway (see example H-1)

N

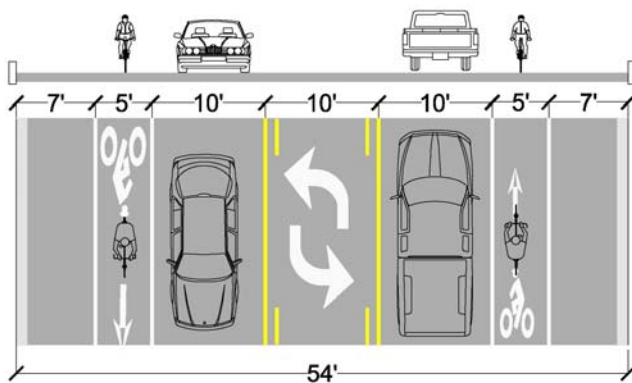


Two Way Four Lane

Additional Considerations

- If the roadway has no curb and parking is allowed on a soft shoulder - width of the soft shoulder should equal or exceed 7 feet

O



Two Way with Center Turn Lane and Parking – 54'

Additional Considerations

- It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover
- It may be advisable to utilize a shared travel lane in locations with high parking turnover on steep grades
- The use of a 10' center turn lane should be avoided on roadways with high volumes of turning heavy vehicle traffic

	<p style="text-align: right;">O-1</p> <p>Two Way with Center Turn Lane and Parking – 58'</p> <p>Additional Considerations</p> <ul style="list-style-type: none"> • It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover • It may be advisable to utilize a shared travel lane in locations with high parking turnover on steep grades • The use of a 10' center turn lane should be avoided on roadways with high volumes of turning heavy vehicle traffic
	<p style="text-align: right;">O-2</p> <p>Two Way Four Lane with Parking – 54'</p> <p>Additional Considerations</p> <ul style="list-style-type: none"> • For use of SLM, see discussion of considerations in this document and in Appendix N
	<p style="text-align: right;">P</p> <p>Two Way Four Lane with Parking – 64'</p> <p>Additional Considerations</p> <ul style="list-style-type: none"> • It may be advisable to utilize a buffered bicycle lane in locations with high parking turnover • It may be advisable to utilize a shared travel lane in locations with high parking turnover on steep grades

APPENDIX G. BICYCLE ROUTE SIGNAGE AND WAYFINDING PROTOCOL

Bicycle route signs will be posted on designated roadways and trails to direct bicyclists to major destinations throughout Seattle. Pavement markings will also be used to assist with wayfinding in some locations. The protocol for locating signs and markings is described below. Several routes will be signed during the first year after this Plan is adopted, and modifications will be made to this protocol based on this experience.

General

- Use standard City and regional sign designs developed as a part of this Plan (see below).
- Follow MUTCD standards for sign installation, such as minimum height of signs above ground and horizontal placement from edge of the roadway or trail.
- Post the regional route sign separate from the City route sign on all segments that are both regional and City routes (e.g., combined signs will not be used).
- City route signs should include a directional arrow, destination and distance.
- Destinations on signs should be named using Urban Villages and Urban Centers, major transit hubs and regional parks (see the major activity center names on Figure 1: Major Bicycle Destinations and Key Bicycle Corridors).
- Whenever any type of sign or marking is used on a bicycle route, there must always be a sign that shows the direction to follow to remain on the route.
- While a route may extend the length of the City, it should not show all destinations on a single sign; instead, it should show important intermediate destinations
- When directional subplate signs (e.g., “blades”) are used, the sign listing the closest destination should be on top, and the furthest destination should be on the bottom. A maximum of three directional subplate signs should be used on any single bicycle route sign.
- Reduced-size signs can be used as route confirmation signs on regional routes. These smaller signs may be placed lower to the ground or on different types of poles than the regular-size signs.
- Regional route signs can be installed on the same or separate posts as the City route signs. When regional route signs are added to a post with City route signs, they should be the small-sized version of the regional route sign, and they should go underneath the City route signs.

Bicycle Routes on Trails

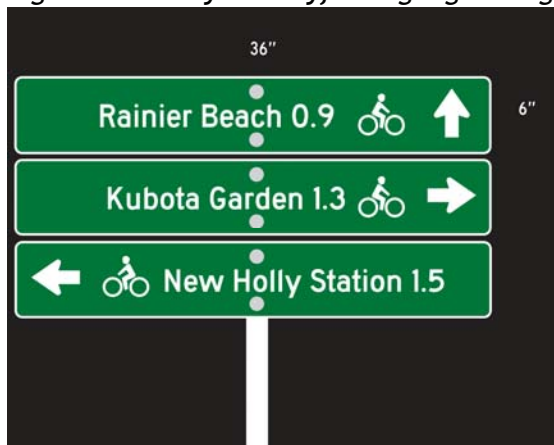
- Post bicycle route signs at all major decision points along the trail (feeder trail intersections, forks in the trail, etc).
- Provide bicycle route confirmation signs
 - After all roadway crossings (local streets and arterials)
 - Every one-third to one-half mile, depending on the segment length, sight distance, and need for confirmation signs
- Provide directional signs indicating how to access nearby destinations from the trail
 - Feeder streets between nearby destinations and the route may have sign subplates to indicate direction and distance to the destination or to the route
- Street name signs should be placed at all locations where trails intersect streets (this type of sign should have a sign blade for both the street name and the trail name)

Bicycle Routes on Streets

- Post bicycle route signs at all turns or decision points along the route
- On non-arterial streets, use circular dot bicycle pavement markings with an arrow (or other markings) to indicate turns along an on-street route where signs may be difficult to see because of parked cars or vegetation (optional: use bike-in-arrow markings to indicate turns)
- Route confirmation signs
 - Provide bicycle route confirmation signs every one-third to one-half mile on straight segments of the route, depending on the locations of crossings with other bicycle routes, locations of primary arterial roadway crossings, sight distance, and overall frequency of street crossings
 - Locate bicycle route confirmation signs near crossings of other bicycle routes and primary arterial roadway crossings on straight segments of bicycle routes
 - Confirmation signs may also be complemented by pavement markings
- Provide directional signs indicating how to access nearby destinations from the signed bicycle route
 - Feeder streets between nearby destinations and the route may have sign subplates to indicate direction and distance to the destination or to the route
 - Pavement markings may be used on feeder streets to supplement signs
- Spot signage can be installed to show bicyclists how to access and cross bridges, travel through complicated areas, and connect through gaps between existing sections of bicycle facilities (this signage does not need to be part of a signed route)

Sign designs for bicycle wayfinding on city streets and on Urban Trails and Bikeways System routes were developed during the Bicycle Master Plan process. These designs are shown in Figure G.1: Bicycle Wayfinding Sign Designs. The Seattle Parks and Recreation Department is working with SDOT to develop brown signs for routes on Olmstead Boulevards.

Figure G.1. Bicycle Wayfinding Sign Designs



Example wayfinding signs for City routes



Example wayfinding sign for regional route

APPENDIX H. ROADWAY CROSSING DESIGN FOR BICYCLES

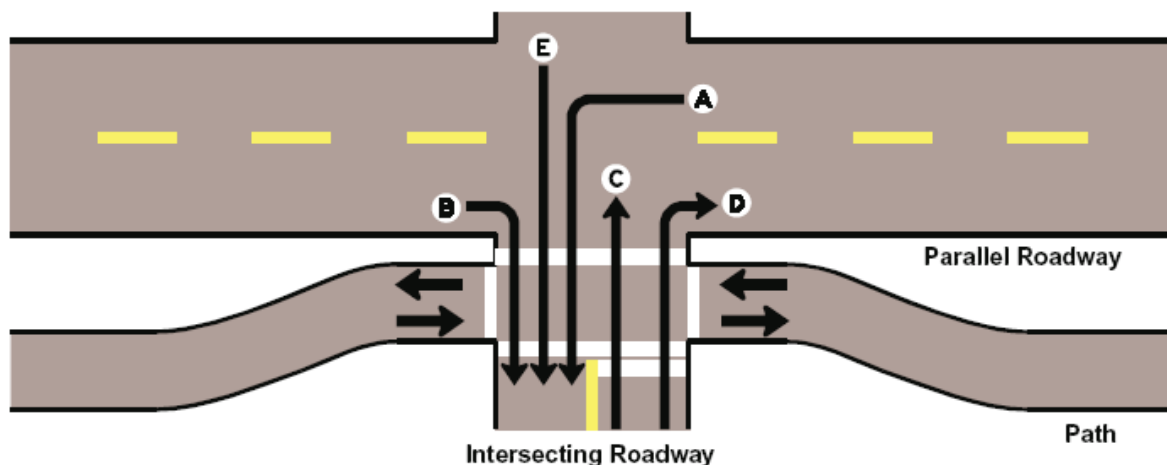
Traffic Control and Right-of-Way Assignment for Multi-purpose Trail Crossings

This section describes the policy on traffic control and right-of-way assignment for trail crossings. There are two primary categories of trail/roadway crossings. The first type of crossing is an intersection of two or more streets where the trail crosses at least one of the streets at the intersection. The second type of trail/roadway crossing is mid-block (e.g., typically at least 30 to 50 feet from an intersection).

Trail Crossings at Intersections

When trails cross roadways at intersections, the trail should generally be assigned the same priority as the parallel roadway. This applies at intersections with all types of traffic control. The AASHTO Bicycle Guide describes these types of intersections as “adjacent path crossings” (see figure H-1 below).

Figure H-1. Example of an adjacent path intersection depicting typical vehicle movements across the path



Source: AASHTO Guide for the Development of Bicycle Facilities, 1999

Signalized Intersections

At signalized intersections, if the parallel roadway has signals that are set to recall to green every cycle, the walk signals for the trail should also be set to recall to green. The walk interval should be maximized within the green interval:

$$\text{WALK interval} = \text{Green Interval} - \text{Flashing Don't Walk Interval}$$

Therefore, when the trail crosses the intersection parallel to a major street that has a long green interval, trail users will see WALK signals for a significant portion of each signal cycle. At locations where the parallel roadway has dedicated turn lanes, with protected signal turn phasing, the trail shall be given a red or don't walk signal during the protected phase to prevent conflicts between the trail and the turning vehicles. The trail signal should change to a walk or green signal as soon as the protected turn phase ends.

Where the parallel roadway is actuated, the trail crossing will also need to be actuated. For trail crossings, the minimum WALK interval should be 10 seconds. The USE PED SIGNAL sign (R9-5) should be used at trail crossings at signalized intersections. Countdown pedestrian signals should be installed at all signalized trail crossings as signal heads are replaced.

4-way Stop-controlled Intersections

Intersections with 4-way stops should generally be avoided. However, if trails cross at intersections with four way stops, additional stop signs should be added as needed to ensure that there is at least one appropriately-placed STOP sign at each trail approach.

Consideration should be given to removing stop signs for the trail and the parallel roadway leaving the intersection 2-way stop controlled for the intersecting roadway. An engineering study should be conducted before stop removing or adding any stop signs.

2-way Stop-controlled Intersections

At intersections with STOP signs controlling only one of the approaches, the trail should be assigned the same right-of-way as the parallel street. Stop signs should not be placed on the trail approaches to the intersecting roadway if the parallel street has no stop signs. The trail should have the same control as the parallel street.

If the two streets have the same roadway classification, and the stop signs face the intersecting street that is parallel to the trail, consideration should be given to reversing the stop sign placement, giving the right-of-way to the trail and the parallel street. Appropriate warning signs and markings should be placed on the trail and roadway.

Mid-block Trail Crossings

At mid-block trail crossings, traffic control should generally be one of the following:

- Traffic Signal
- Stop signs facing the trail
- Stop signs facing the roadway
- Yield signs facing the trail
- Yield signs facing the roadway

The decision of whether or not to use a traffic signal at a mid-block trail crossing should be primarily based on the installation criteria and procedures for pedestrian traffic signals found in SDOT's Director's Rule 04-01. All trail users (including bicyclists) should be included in calculating the "pedestrian volume" for the warrant procedure outlined in Rule 04-01. Since pedestrians are common trail users and they are generally the slowest trail users, the gap acceptance portions of the warrant procedure in Rule 04-01 should be used as well. When a trail crossing meets the warrants outlined in Rule 04-01, there may be other reasons why a signal is not necessary at the crossing. Engineering judgment should be applied in making the final decision of whether or not to install the signal.

Where a decision has been made not to install a traffic signal at a mid-block trail crossing, STOP or YIELD signs should be used to assign the right-of-way to the trail or the roadway. The assignment of priority at a shared-use path/roadway intersection should be assigned with consideration of the following:

- The relative importance of the trail and the roadway;
- The relative volumes of trail and roadway traffic; and

- The relative speeds of trail and roadway users.

The City of Seattle has four classifications of streets:

- **Principal Arterials**
- **Minor Arterials**
- **Collector Arterials**
- **Access Streets** (residential and commercial)

As part of the Seattle Bicycle Master Plan, two classifications of signed routes are proposed; regional signed routes and local signed routes. Major trails in the city will be included in the signed route system. As such, there are three proposed classifications for trails:

- **Regional Trails** (trails that are part of regional signed routes);
- **Local Through Trails** (trails that are part of the local signed route system); and
- **Minor Trails** (other trails including short connectors and trails in small parks).

The street and trail classifications described above make it possible to quantify the relative importance at each trail/roadway crossing. The following guidelines should be used to assign right-of-way.

- **Regional Trails** are effectively principal arterials for bicyclists, but trail user speed is generally lower than that on **Principal Arterial** streets. Therefore, **Regional Trails** should generally be given priority over **Minor Arterials**, **Collector Arterials**, and **Access Streets**. However, if the traffic volume on the street being crossed exceeds the traffic volume on the trail by 20% or more, the street should be given priority.
- **Local Through Trails** are like minor arterials for bicyclists, but trail user speed is generally lower than that on **Minor Arterial** streets. Therefore, **Local Through Trails** should generally be given priority over **Collector Streets** and **Access Streets**. Again, if the traffic volume on the street being crossed exceeds the traffic volume on the trail by 20% or more, the street should be given priority.
- **Minor Trails** have roughly the same importance as Access Streets. Therefore, **Minor Trails** should normally not be given priority over any classification of **Arterial**. Where **Minor Trails** cross **Access Streets**, the priority should be assigned to the facility that has the most volume.

When new trails are built, they are often built in segments; so the trail user volume is low at first. Therefore, the right-of-way will likely need to be initially assigned to the streets that the trail crosses. However, as time goes on, the trail volumes will increase, perhaps changing the appropriate assignment of right of way. As such, trail/roadway crossings should be evaluated every few years to ensure that the right-of-way is assigned appropriately.

Pavement Markings

All trail crossing areas should be marked with a crosswalk according to the rules set forth in SDOT Director's Rule 04-01.

Advanced "TRAIL XING" word pavement markings should be utilized at all crossings where the trail crossing is determined to be unexpected.

Trail Warning Signs

All signs related to pedestrian/bicycle activity should be fluorescent yellow-green. It is recommended that the trail crossing warning sign be utilized at all trail crossings that are

uncontrolled for motorist. The crossing sign shall be supplemented with the downward arrow subplate (see Figure H-1).

Figure H-1. Trail Warning Signs

Advanced Warning Signs

It is recommended that the use of advanced warning signs be used at most crossing locations, especially those locations with restricted sight distance or areas where it is determined that the trail crossing would be unexpected. Advanced warning signs might not be used in highly urbanized situations where there are short blocks or where two or more marked crosswalks are close together. It is recommended that all advanced warning signs include the “distance ahead” subplate (W16-2a).

The subplates in Figure H-2 should be added to advanced warning signs.

Figure H-2. Advanced warning sign subplates.

Figure H-3. Example trail-roadway crossing with trail yield treatment

Selecting Appropriate Arterial Crossing Treatments for Bikeways

The following procedure should be used to select an appropriate crossing treatment when a minor street with a signed bike route or bicycle boulevard crosses an arterial street.

There are six possible design treatments that may result from this evaluation (see descriptions in previous section):

1. Mark crosswalk, no other improvements needed.
2. Curb extensions into the parking lane to narrow the crossing with for bicyclists (and pedestrians)
3. Raised median placed in center turn lane.
4. Raised median island created by tapering out the parking lane.
5. Traffic signal (possibly with curb extensions if on-street parking exists).
6. Raised island with 2-step traffic signal with off-set crosswalk markings (short section of sidewalk down the center of the median separates the crosswalks by at least 15 feet).

The set of charts below has been developed to assist the City in selecting the best crossing treatment for different types of roadway crossings. The following question should be used to determine which chart should be referenced:

QUESTION: *How many travel lanes are being crossed?*

- Two lanes, no center turn lane (see Chart 1)
- Two lanes, with center turn lane (see Chart 2) (note - a center turn lane can not be treated as a crossing island unless a formal crossing island is installed; without a crossing island, this is a three-lane arterial)
- Four or more lanes, undivided (see Chart 3)
- Four or more lanes, with continuous raised median or center turn lane (see Chart 4)

The charts require determining how many gaps in traffic are available for bicyclists to use to cross the roadway under [rush-hour conditions].

A crossable gap shall be calculated using the formula

$$W/10 + 6.5 + (n-1)2 = \text{___ Seconds}$$

where W is the distance in feet from the curb, or the distance in feet from the curb to a raised refuge island (if the refuge island is a dependable source of protection). The value of 10 is the travel speed of slower bicyclists. The value of 6.5 includes 3 seconds of perception and reaction time in seconds plus 3.5 seconds which accounts for the length of a bicycle (6 feet) as well as acceleration time for a 10 mph cyclist who accelerates fairly slowly. The formula is based on the standard bicycle crossing time formula:

$$t_{\text{cross}} = t_r + v/2a + (w+l)/v$$

where:

- t_{cross} = time to cross the intersection
- t_r = reaction time (3 sec)
- v = bicyclist speed (mph) (10 mph to 20 mph)
- a = bicyclists acceleration (1.5 to 3 ft per second per second)
- w = width of crossing (ft)
- l = bicycle length (6 ft)

Chart 1: Two Lanes, No Center Turn Lane

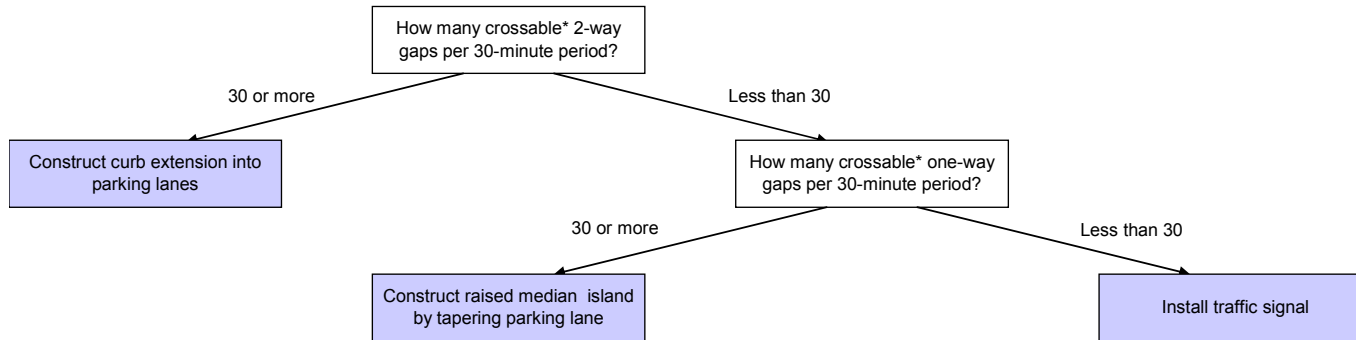
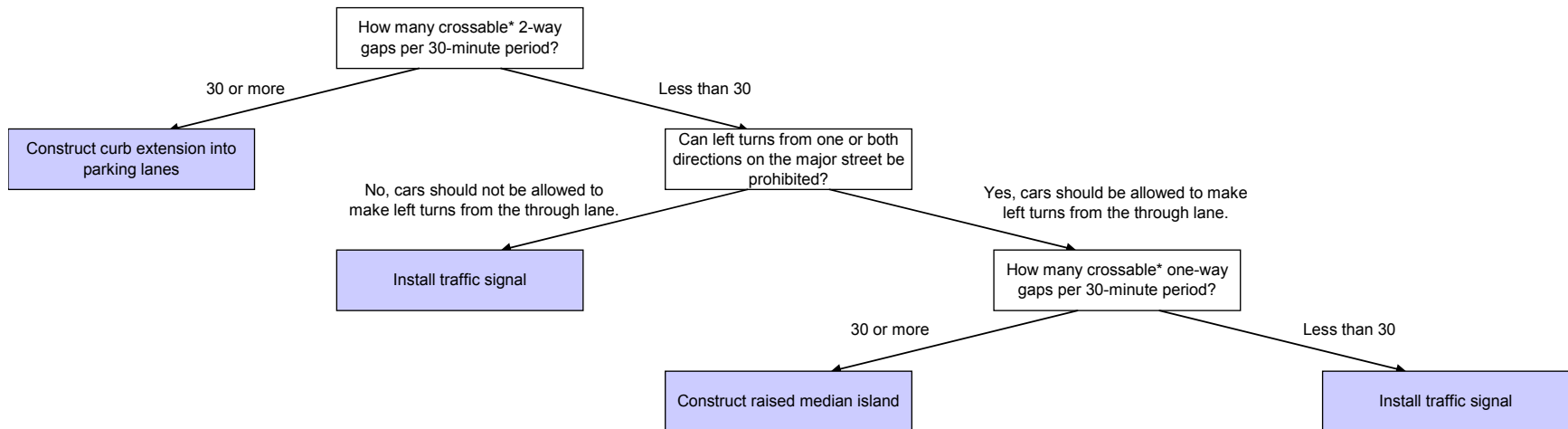


Chart 2: Two Lanes, With Center Turn Lane



*A crossable gap shall be calculated using the formula $W/10 + 6.5 + (n-1)2 = \text{Seconds}$, where W is the distance in feet from the curb, or the distance in feet from the curb to a raised refuge island (if the refuge island is a dependable source of protection). The value of 10 is the travel speed of slower bicyclists. The value of 6.5 includes 3 seconds of perception and reaction time in seconds plus 3.5 seconds which accounts for the length of a bicycle (6 feet) as well as acceleration time for a 10 mph cyclist who accelerates fairly slowly.

Chart 3: Four or More Lanes, Undivided

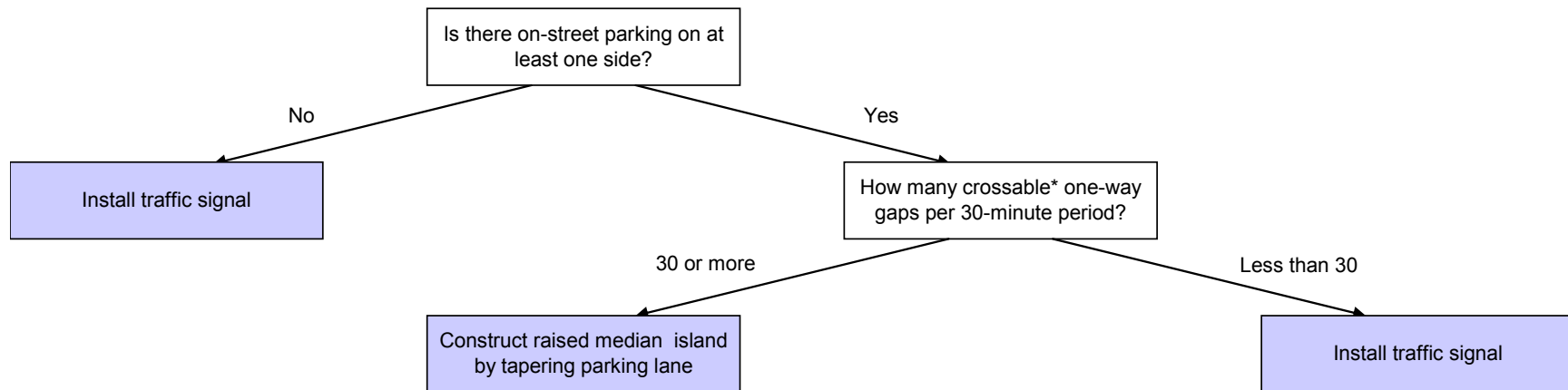
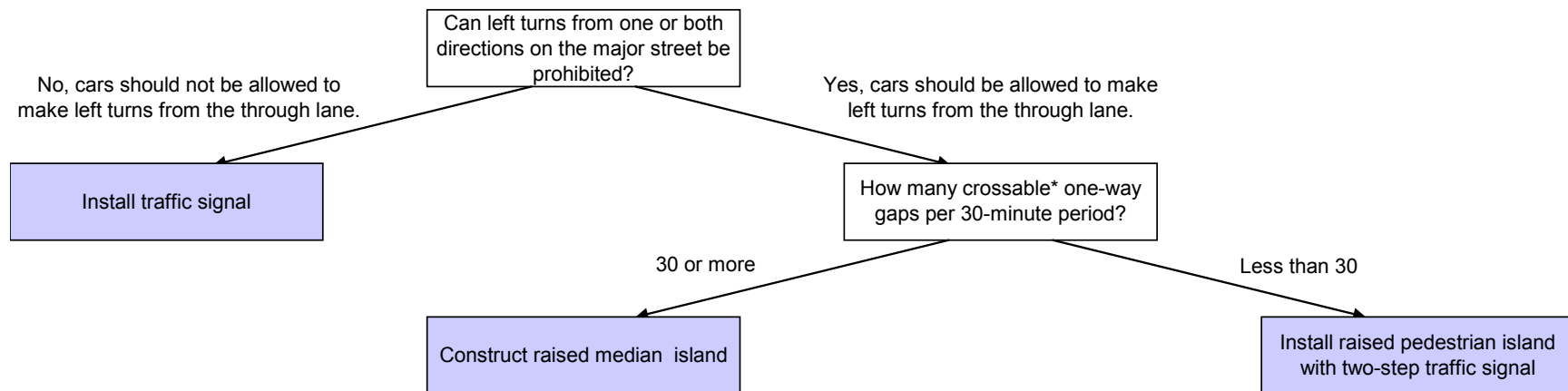


Chart 4: Four or more lanes, with continuous raised median or center turn lane



*A crossable gap shall be calculated using the formula $W/10 + 6.5 + (n-1)2 = \text{Seconds}$, where W is the distance in feet from the curb, or the distance in feet from the curb to a raised refuge island (if the refuge island is a dependable source of protection). The value of 10 is the travel speed of slower bicyclists. The value of 6.5 includes 3 seconds of perception and reaction time in seconds plus 3.5 seconds which accounts for the length of a bicycle (6 feet) as well as acceleration time for a 10 mph cyclist who accelerates fairly slowly.

APPENDIX I. BICYCLE FACILITY RECOMMENDATIONS FOR KEY CORRIDORS AND FOCUS AREAS

The table below includes detailed descriptions of recommendations in key corridors and focus areas of the Bicycle Facility Network. Each row corresponds with a numbered location on the Bicycle Facility Recommendations Map.

Map Number	Text Note
1	Identify connections from Northeast Seattle neighborhoods to the Burke-Gilman Trail.
2	Consider adding a traffic signal to facilitate bicycle crossings at Sand Point Way NE & NE 78th Street.
3	Improve bicycle access at the entry point to north side of Magnuson Park--NE 78th Street
4	Improve bicycle access at the entry point to south side of Magnuson Park--NE 65th Street
5	Identify best connection between trail on east side of UW Campus and Burke-Gilman Trail (across Union Bay Place NE).
6	Planned intersection reconfiguration at Ravenna Ave NE & Ravenna Place NE.
7	Identify best connection between University District and NE 65th Street (Across Ravenna Boulevard).
8	Significant public demand exists for constructing multi-use trail between Brooklyn Avenue NE and Ravenna Place NE through Ravenna Park.
9	Consider alternatives for route connectivity in neighborhood of NE 75th Street and Lake City Way.
10	Two alternatives for crossing I-5 in the vicinity of NE 80th Street: Either reconstruct NE 80 th Street crossing of I-5 to include bicycle lanes OR construct new bicycle and pedestrian bridge across I-5 in the vicinity of NE 80th Street.
11	Three alternatives for north/south connections through the University District: If Roosevelt Way and 11th Avenue NE remain as one-way streets, switch the full time parking to the left side of the street, restripe lanes, and consider a peak-hour bike lane; if Roosevelt Way and 11th Avenue NE become 2-way streets, consider installing climbing lanes on one of the roadways or install a northbound bike lane on one road and a southbound bike lane on the other road. If either of these alternatives are not feasible, add shared lane pavement markings to Brooklyn Avenue NE.
12	In the short-term, install bike lanes, climbing lanes, and shared lane pavement markings on NE 45th Street. In the short-term, stripe bike lanes on 5th Avenue NE and 7th Avenue NE between NE 45th Street and NE 50th Street to allow bicyclists to utilize the NE 50th Street Bridge to cross I-5. In the long-term, construct a new bicycle and pedestrian bridge across I-5 at NE 47th Street.
13	Redesign interchange between the north end of the University Bridge, Eastlake Avenue NE, and NE Campus Parkway to resolve right-turn conflicts.
14	Construct an overpass in the area between N 41st Street and N 43rd Street; this may include reconstructing the existing overpass at N 41st Street or building a new structure.
15	Install bike lanes on both sides of N 34th Street/N Northlake Place between Fremont Avenue N and Stone Way N. An alternative would be to install an eastbound bicycle lane and shared lane pavement markings in the westbound curb lane. A contraflow bike lane should be provided on the one-way section of N Northlake Place.
16	The sidewalks on the Aurora Bridge should be used as a one-way couplet. Higher rails should also be considered for the Aurora Bridge sidewalks.
17	Redesign intersection of Ballard Avenue NW and 17th Avenue NW to manage speeds and make movements more predictable.

18	Identify best east/west connections through the Ballard neighborhood (NW 56th Street/NW 57th Street/NW 58th Street)
19	In the future, reconstruct Seaview Place NW with a bicycle climbing lane.
20	Two alternatives for east-west connections through lower Queen Anne: If Roy Street and Mercer Street remain as a one-way couplet, install one-way bike lanes on the north side of each roadway; If Roy Street and Mercer Street are converted to two-way streets, bike lanes should go on both sides of Roy Street. In each case, a bicycle and pedestrian bridge should be constructed on the north side of Mercer Street between 6th Avenue N and Dexter Avenue N (over Aurora Avenue N).
21	Construct multi-use trail as a part of the SR 520 reconstruction project between 10th Avenue E and Montlake Boulevard NE and also from Montlake Boulevard NE to the east across Lake Washington.
22	Identify best east/west connection between Melrose Avenue E and Broadway E.
23	Improve bicycle facilities on N Denny Way Bridge and Minor Avenue Bridge across I-5. Utilize both bridges to make connections between South Lake Union and Capitol Hill.
24	Restripe the bicycle facility on Martin Luther King Jr. Way so that it has a bike lane on the east side (northbound) and a shared lane pavement marking on the west side (southbound). This facility could operate as a couplet with the bicycle boulevard on 27th Avenue. Two alternatives would be to provide climbing lanes on the uphill portions of Martin Luther King Jr. Way or to remove the center turn lane (except for turning pockets at key intersections) and stripe bike lanes on both sides of Martin Luther King, Jr. Way.
25	Adjust pedestrian/bicycle signal response time at the intersection of the I-90 Trail & Martin Luther King Jr. Way and the I-90 Trail & 23rd Avenue S. The signals should allow trail users to cross very soon after pushing the call button.
26	Provide wayfinding signs to direct bicyclists between the 6th Avenue bike lanes and the Dexter Avenue bike lanes. Bicyclists should be instructed to turn right from 6th Avenue to Blanchard Street, and then left on 7th Avenue to Dexter Avenue. This is a better route than having bicyclists turn right from 6th Avenue to Battery Street to access Dexter Avenue.
27	Acquire abandoned railroad right-of-way to continue existing trolley trail south between S Forest Street and Spokane Street.
28	Study east/west connections across I-5 at Spokane Street. These connections could be made in conjunction with extending the Chief Sealth Trail across I-5 toward Downtown Seattle.
29	When the bicycle and pedestrian bridge overpass is reconstructed across Martin Luther King Jr. Way and Rainier Avenue S at Mount Baker Boulevard, it should be wide enough to accommodate both bicycle and pedestrian traffic comfortably and safely.
30	Repaving and drainage improvements are needed for much of the length of Lake Washington Boulevard and Lakeside Avenue
31	Median crossing islands or a full median should added to SW Admiral Way between SW Olga Street and the West Seattle Bridge (along with bicycle lanes). This should be accomplished by removing parking from the west side of Admiral Way.
32	The connection between SW Andover Street and the West Seattle Bridge is provided by a sidewalk bikeway on the southeast side of Delridge Way SW. This connection should be improved.
33	Identify best shared roadway connection between SW Morgan Street and SW Juneau Street through the new development in the vicinity of 32nd Avenue SW.
34	Restripe existing parking edgelines to 7 feet from the curb face to and install shared lane pavement marking 11 feet from the curb face on SW Admiral Way.
35	Restripe existing parking edgelines to 7 feet from the curb face to and install shared lane pavement marking 11 feet from the curb face on Beach Drive SW.

36	In the short-term, provide a wide outside lane on S Cloverdale Street/Myers Way S. In the long-term, the WA 509 interchange ramps should be reconfigured and bicycle lanes should be provided on S Cloverdale Street/Myers Way S.
37	Connection between 14th Avenue S and W Marginal Place S should be improved. Improvement possibilities include providing a multi-use trail on the east side of the intersection of 14th Avenue S and W Marginal Place S, paving shoulders on 14th Avenue S between S Henderson Street and W Marginal Place S, and adding a bicycle lane to the southbound left-turn pocket on 14th Avenue S.
38	In the long-term, bicycle facilities should be provided as a part of the 16th Avenue S bridge crossing. This is a critical connection in the bicycle network.
39	When the bicycle and pedestrian bridge overpass is reconstructed across WA 99 at S Henderson Street, it should be wide enough to accommodate both bicycle and pedestrian traffic comfortably and safely.
40	Study potential locations to construct a crossing of I-5 to connect the Chief Sealth Trail towards Downtown Seattle. The crossing could be at any location between S Spokane Street and S Snoqualmie Street. The precise location of the pedestrian/bicycle overpass/underpass across I-5 at the west end of the future Chief Sealth Trail extension should take advantage of topography and existing infrastructure.
41	Identify the connection between the Sound Transit Station and Chief Sealth Trail, either on S Myrtle Street or S Willow Street.
42	Long-term connections are needed to provide bicycle access to the Sound Transit Station at the I-5 & Ryan Way interchange. This includes potential improvements to Airport Way S, S Ryan Way, Pacific Highway S, and S 112th Street.
43	Use saw cut or other form of reconstruction to eliminate the concrete joint that is located in the place where bicyclists would ride comfortably before installing sharrows on Renton Avenue S.
44	Sharrows should be provided on both sides of Bell Street and Blanchard Street because bicyclists split evenly between turning left and right from these streets.
45	Provide a short section of sidepath on the east side of Martin Luther King, Jr. Way between Renton Avenue S and S Walden Street to allow bicyclists to utilize a route between York Park and the Mount Baker Sound Transit Station.
46	One of two options should be implemented on 3rd Avenue NW between NW 103rd Street and NW 105th Street to provide bicycle access through this key area for connectivity in Northwest Seattle: 1) A sidepath should be constructed on the east side of the roadway or 2) the roadway should be reconstructed to include bicycle lanes on both sides of the roadway and parking should be consolidated to formalized parking bays on the periphery of the roadway in several locations).
47	NW 58th Street is closed to traffic for periods during the day due to school activity. While there is an existing full traffic signal where NW 58th Street crosses 15th Avenue NW, it may not be an ideal roadway for the east-west bicycle route through Ballard because of the street closure and the fact that it is north of the commercial area.
48	A new traffic signal (pedestrian crossing signal or full signal) should be considered at the intersection of NW 57th Street & 15th Avenue NW. This signal would provide access for an east-west bicycle route through Ballard that uses NW 57th Street in the vicinity of 15th Avenue NW. This signal should be coordinated with the existing full signal at NW 58th Street & 15th Avenue NW.
49	The proposed bicycle and pedestrian bridge on the west side of the Ballard Bridge should be installed at a location that takes advantage of existing topography. This bridge connection requires more detailed study in the future.

50	The left-turn "Bus Only" lane on the northbound exit ramp on the north side of the Aurora Bridge should be marked as "Bus and Bicycles Only". Providing bicycle access in this location will help provide bicycle connectivity into Fremont.
51	Reconfigure intersection of Aurora Avenue, Raye Lower Street, and 6th Avenue N to address bicycle, pedestrian, transit, and motor vehicle issues. Curb ramps should be provided/improved on the south end of the Aurora Bridge to provide better bicycle access.
52	Add bicycle lane to west side of Aurora Avenue (southbound) between Raye Lower Street and Dexter Way N to allow bicyclists that travel southbound on the Aurora Bridge sidewalk to connect to Dexter Way N. No bicycle lane is recommended on the east side of Aurora Avenue.
53	Redesign and reconstruct intersection of Fairview Avenue N and Fairview Avenue E to manage the speed of turning vehicles so that it is safer for bicyclists as well as pedestrians, transit vehicles, and automobiles.
54	Improve pedestrian crossing signal for bicycle sensitivity and direct bicycle crossing at intersection of Lake City Way NE and 20th Avenue NE.
55	Provide paved shoulders and also include paved parking bays on the periphery of Ravenna Avenue NE in several locations. Potential bicycle lanes should be considered on this roadway, particularly in uphill sections.
56	Airport Way S between I-90 and Military Road S will be used in upcoming years to serve overflow traffic during I-5 reconstruction. When the roadway is reconstructed, the City should consider a combination of adding new shoulders, sidepaths, and/or wide outside lanes, as appropriate, to improve bicycle safety and access in this corridor.
57	35th Avenue SW between Avalon Way SW and SW Morgan Street is a high-priority connection that should be studied in the short-term. Potential alternatives that should be evaluated include removing a travel lane, consolidating parking to one side of the street, and/or installing raised median islands so that shared lane pavement markings, climbing lanes, and/or full bicycle lanes can be installed. Consideration should also be given to constructing a sidepath on the east side of the street in the blocks adjacent to the West Seattle Golf Course.
58	Eastlake Avenue E between the University Bridge and Fairview Avenue N is a critical connection between the University of Washington and Downtown Seattle. This constrained corridor is a very high-priority for improving bicycle connectivity. Potential bicycle facility recommendations should be considered along with other travel modes on a block-by-block basis in the corridor. Different bicycle treatments should be implemented under different options, including bicycle lanes, climbing lanes, and shared lane pavement markings. If light rail tracks are installed, the tracks should be in the center of the roadway, which will require removing the existing median and restricting left-turn movements to particular intersections. Removing the median will require more pedestrian crossing signals to be installed. If there is no light rail in the Eastlake Corridor, bicycle lanes could be provided by removing the median island and center left-turn lane and restricting left turns to specific intersections or changing parking restrictions some blocks. Other alternative actions to create bicycle facilities should include narrowing existing travel lanes and removing peak-hour parking restrictions so that bicyclists can ride more easily in the space to the left of parked cars and out of the door zone.
59	Provide new median cut-through and crosswalk on the west side of the intersection of NE Northgate Way & 8th Avenue NE. This will also require modifying the design of the pedestrian crossing signal at this intersection.
60	The City of Seattle has asked the Washington State DOT to study the connection between a proposed multi-use trail on the new bridge as a part of the SR 520 Bridge project.
61	Bicycle cut-through across diagonal diverter should be improved to provide more convenient access for signed bicycle route.
62	Consider striping a centerline on sections of the Burke-Gilman Trail with very high user volumes, such as near the University of Washington and other locations where sight distance

	may be compromised.
63	Reconstruct trail bridge between 33rd Avenue W and 32nd Avenue W to accommodate both pedestrians and bicyclists.
64	Explore possible travel lane channelization improvements near the intersection of Gilman Avenue W and W Fort Street.
65	Add shared lane pavement markings to south (downhill) side of W Emerson Place, and improve conditions for bicyclists on the sidewalk on the north (uphill) side of W Emerson Place.
66	Provide bicycle access between Green Lake and North Seattle Community College by either installing shared lane pavement markings on Wallingford Avenue N or designating Ashworth Avenue N as a non-arterial street commonly used by bicyclists.
67	Reconfigure intersection of E Green Lake Way N and W Green Lake Way N to address bicycle, pedestrian, transit, and motor vehicle issues.
68	Consider adding a traffic signal at Eastlake Avenue and Harrison Street; the two blocks of Harrison Street between Pontius Avenue and Eastlake Avenue are one-way, so they may need to be coupled with two blocks of Republican Street or Mercer Street.
69	Western Avenue and Elliott Avenue between Denny Way and Bell Street require additional study. It may be desirable to have bicycle facilities on these roadways to serve the new residential and commercial developments on the north side of Belltown, but they lead to difficult crossings of Denny Way.
70	Reconstruct Alaskan Way/E Marginal Way S with well-designed bicycle lanes on both sides. There is an existing bicycle lane on the east side of Alaskan Way/E Marginal Way S, but no bicycle lane on the west side of this roadway.
71	It is possible to provide bicycle lanes on SW Alaska Street if on-street parking is removed.
72	Study both the bicycle lane and multi-use trail alternatives in the Myers Way S corridor.
73	Conduct additional study to determine the best location to cross Fontleroy Way SW between SW Avalon Way and SW Alaska Street.
74	Include bicycle facilities as a part of any future roadway and bridge reconstruction projects on S Lander Street and S Holgate Street. These two roadways are critical connections across the area south of Downtown Seattle, and must provide safe and convenient bicycle access.
75	Improve wayfinding signage and pavement markings and make surface and other maintenance improvements on the West Seattle Low-Level Bridge Trail.
76	Consider providing a track or trough beside the stairs between the intersection of S Spokane Street & Airport Way S and Beacon Hill. This would make it much easier for bicyclists to travel with their bicycles up and down the hill.
77	Post "Share the Road" with bicycles signs on Elliott Avenue W and 15th Avenue W.
78	Improve the intersection of S Dearborn Street & Rainier Avenue S to facilitate bicycle connectivity between the existing bicycle lanes on S Dearborn Street and the proposed Hiawatha Place S bicycle boulevard.
79	Requests have been made by citizens to improve lighting through Judkins Park to improve safety and security when accessing the I-90 Trail.
80	If properties are redeveloped with non-water-dependent land uses on Westlake Avenue N, buildings should be constructed close to Westlake Avenue (where the existing parking lot is). This would provide space along the waterfront area for public use, including a wide-surface multi-use trail.
81	Requests have been made by citizens to keep the locks open after 9 p.m. so that bicyclists can continue to cross the canal during the late evening and early morning hours.

82	Consider several alternatives for improving bicycle access across the rail yard north of Georgetown in the vicinity of Airport Way S and 6th Avenue S. These alternatives include: 1) Construct a multi-use trail on the west side of the Stacey Yard Bridge (Airport Way S) and widening the existing sidewalk on the west side of Airport Way S between the bridge and S Alaska Street; 2) Construct a new bicycle and pedestrian bridge across the rail yard at 6th Avenue S.
83	The proposed alignment of the pedestrian pathway with bicycles permitted in the area north of SW Hudson Street is conceptual.
84	The proposed alignment of the pedestrian pathway with bicycles permitted in the area south of SW Holly Street is conceptual.
85	Requests have been made by citizens to provide bicycle lanes on Rainier Avenue S, but more detailed engineering study is needed to determine the feasibility of these facilities.
86	Conduct engineering study to determine the feasibility of constructing a multi-use trail between the intersection of 24th Avenue S & S Bayview Street and the intersection of S McLellan Street & 26th Avenue S.
87	Conduct a detailed study of bicycle access to the south side of the Ballard Bridge and recommend specific safety and connectivity improvements.
88	The Seattle Parks Department is interested in working with SDOT to develop a signed route through Discovery Park and possibly some of the other larger Seattle parks.
89	The service road under the I-5 freeway between E Aloha Street and E Howe Street requires further study to determine if it can be developed into a multi-use trail.

APPENDIX J: BICYCLE AND TRANSIT INTEGRATION IN SEATTLE

KC/METRO has earned a reputation as being one of the most bicycle-friendly transit agencies in America, owing to their early development and subsequent refinement of the Bike & Ride program. KC/METRO has been a pioneer in the specific development of “Sportworks” transit vehicle bicycle carrier rack, and their decision to comprehensively equip their entire fleet of coaches has resulted in significant bus usage by bicyclists. For example, approximately 10,000 bicycles were loaded on KC/METRO buses per week throughout the region in August 2002.

In addition, KC/METRO has worked to improve the quantity and quality of bicycle parking at transit facilities throughout Seattle and King County, including funding (with the PSRC and The City of Seattle) development of BikeStation Seattle. This bicycle parking facility was the first staffed bicycle parking facility in Washington.

In 1996, residents of King, Pierce, and Snohomish Counties voted to fund the Sound Transit high-capacity regional bus and rail transit services. The Sound Transit system includes commuter rail service to King Street Station in Seattle from Tacoma in the south and from Everett to the north, and regional express bus service linking activity centers throughout the region. The centerpiece of the system is the Link Light Rail System which is scheduled to open in 2009 and will serve a corridor from the University District to Sea-Tac Airport via the Downtown Seattle Transit Tunnel.

In 1999, Sound Transit adopted general policies guiding development of service supporting bicycle access to regional transit service. Based on a concept of TOTAL Access (see CALL-OUT BOX), the policies are intended to ensure that the unique characteristics of bicycling and long-haul high-capacity transit are utilized in an efficient manner that accommodates an increasing number of trips accessed by bike.

CALL-OUT BOX:

Sound Transit TOTAL Access Policy

“Sound Transit is committed to encouraging and providing bicycle access and has adopted a policy of total access for cyclists—on transit vehicles and at stations.”

--Sound Transit website

T: To the transit system

O: On the vehicles

T: Through and across barriers created by the system

A: At the stations

L: Low-cost, effective and efficient

Both Sounder Commuter Rail and the Regional Express bus service have bicycle access systems and policies that are familiar around the United States. In the case of Link, there is significant interest in the manner in which the new system will accommodate bicyclists both on transit vehicles and at stations. Concerns have been expressed by the public and by local jurisdictions that station designs in particular do not provide either adequate space for bicycle parking or enough potential capacity at start-up to serve what is expected to be significant bicycle access volumes. This is particularly true for the stations north of the King Street Station.

In 2000, the Puget Sound Regional Council conducted a study to determine the feasibility of creating larger, staffed bicycle parking facilities known as Bikestations at key locations on the Sound Transit and KC/METRO transit networks. A key component of the study was development of a demand-assessment methodology that could predict potential bicycle parking demand at transit-related facilities. The study envisions development of high capacity Bikestations at several specific locations, including:

- King Street Station / Pioneer Square (currently open)
- Montlake Flyer Station - SR 520
- University of Washington
- Tacoma Dome Station
- Everett Station
- Overlake Park & Ride (programmed)
- Downtown Bellevue Transit Center (programmed)
- International District Transit Station

The study did not assess (with the exception of the International District facility) Link Stations. At the time, necessary information on projected volumes of users, on-vehicle carrying characteristics, and station design were unavailable. Recent approval of an extension of the initial Link segments to the University of Washington will bring LRT to an area of Seattle with the highest levels of both bike use and bike/transit access. In addition, a station is proposed near the Burke-Gilman Trail and the existing Montlake Flyer Stop - both centerpieces of bicycle commuting in the City of Seattle.

Recent voter approval of King County's Transit Now bond issue promises to increase bus service in a number of specific corridors, including development of Bus Rapid transit service with new vehicles and increased service frequency. This increase in transit capacity will bring more Bike & Ride space to key corridors such as SR 520, and reduce waiting times at locations where Bike & Ride capacity deficiencies occur, most notably at Montlake Station on SR 520.

APPENDIX K: CITY OF SEATTLE BICYCLE PARKING REQUIREMENTS

This appendix contains the existing bicycle parking requirements for the City of Seattle. The requirements for Downtown Seattle are contained in the Seattle Municipal Code, and the requirements for areas outside of Downtown are included in the Land Use Code. The Plan recommends updating these requirements to provide additional bicycle parking spaces.

Bicycle Parking Requirements: Downtown Seattle

Council Bill Number: 115524

Ordinance Number: 122054

AN ORDINANCE related to land use and zoning; revising regulations for Downtown Seattle; amending the scope of Design Review departures from Land Use Code requirements; repealing, amending and adding definitions; amending, repealing and re-codifying various provisions and maps of the City of Seattle Land Use Code, Title 23 of the Seattle Municipal Code; providing for penalties; adopting Downtown Amenity Standards; providing for conditions to bonus development, including Leadership in Energy and Environmental Design ("LEED") criteria; and amending the Official Land Use Map, SMC 23.32, to rezone portions of Downtown.

Date introduced/referred: March 20, 2006

Date passed: April 3, 2006

Status: Passed as Amended

Vote: 8-0 (Excused: Drago)

Date of Mayor's signature: April 12, 2006

Committee: Urban Development and Planning

Sponsor: STEINBRUECK

23.49.019 Parking quantity, location and access requirements, and screening and landscaping of surface parking areas.

The regulations in this section do not apply to the Pike Market Mixed zones.

E. Bicycle Parking

1. The minimum number of off-street spaces for bicycle parking required for specific use categories is set forth in Chart 23.49.019 A below. In the case of a use not shown on Chart 23.49.019 A, there is no minimum bicycle parking requirement. After the first fifty (50) spaces for bicycles are provided for a use, additional spaces are required at one half (1/2) the ratio shown in Chart 23.49.019 A. Spaces within dwelling units or on balconies do not count toward the bicycle parking requirement.

Chart 23.49.019 A*

Use	Bicycle Parking Required
Office	1 space per 5,000 square feet of gross floor area of office use
Hotel	0.05 spaces per hotel room
Retail use over 10,000 square feet of gross floor area	1 space per 5,000 square feet of retail use
Residential	1 space for every 2 dwelling units

*After the first 50 spaces for bicycles are provided for a use, additional spaces are required at one-half the chart ratio values.

2. Required bicycle parking shall be provided in a safe, accessible and convenient location. Bicycle parking hardware shall be installed according to its manufacturer's instructions, and the Seattle Department of Transportation design criteria, allowing adequate clearance for bicycles and their riders. Directional signage shall be installed when bike parking facilities are not clearly visible from the street or sidewalk. When any covered automobile parking is provided, all required long-term bicycle parking shall be covered. When located off-street, bicycle and automobile parking areas shall be separated by a barrier or painted lines.

3. Bicycle parking facilities for nonresidential uses shall be located on the lot or in a shared bicycle parking facility within one hundred (100) feet of the lot, except as provided in subsection 6 below.

4. Bicycle parking for residential uses shall be located on-site.

5. Co-location of bicycle parking facilities by more than one (1) use is encouraged.

6. For nonresidential uses, the applicant may make a payment to the City to fund public bicycle parking in the public right-of-way in lieu of providing required bicycle parking on- or off-site, if the Director determines that:

- a. Safe, accessible and convenient bicycle parking accessory to a nonresidential use cannot be provided on-site or in a shared bicycle parking facility within one hundred (100) feet of the lot, without extraordinary physical or financial difficulty;
- b. The payment is comparable to the cost of providing the equivalent bicycle parking on-site, and takes in consideration the cost of materials, equipment and labor for installation; and
- c. The bicycle parking funded by the payment is located within sufficient proximity to serve the bicycle parking demand generated by the project.
- d. Any such payment shall be placed in a dedicated fund or account and used within five (5) years of receipt to provide the bicycle parking.

F. Bicycle Commuter Shower Facilities

Structures containing two hundred fifty thousand (250,000) square feet or more of office gross floor area shall include shower facilities and clothing storage areas for bicycle commuters. One shower per gender shall be required for every two hundred fifty thousand (250,000) square feet of office use. Such facilities shall be for the use of the employees and occupants of the building, and shall be located where they are easily accessible to parking facilities for bicycles.

Bicycle Parking Requirements: Outside of Downtown Seattle

Jory Phillips/Lish Whitson/Margaret Klockars/Bob Morgan/Rebecca Herzfeld
Commercial Code 2006 LU Code Ord v8
September 15, 2006
Version # 8

Bicycle parking

The minimum number of off-street parking spaces for bicycles required for specified uses is set forth in Chart E. In the case of a use not shown on Chart E, there is no minimum bicycle parking requirement. The minimum requirements are based upon gross floor area of the use in a structure, or the square footage of the use when located outside of an enclosed structure, or as otherwise specified.

1. After the first fifty (50) spaces for bicycles are provided, additional spaces are required at one half (1/2) the ratio shown in Chart E, except for rail transit facilities; passenger terminals; and park and ride lots. Spaces within dwelling units or on balconies do not count toward the bicycle parking requirement.
2. Required bicycle parking shall be provided in a safe, accessible and convenient location. Bicycle parking hardware shall be installed so that it can perform to its manufacturer's specifications and any design criteria promulgated by the Director of Transportation, allowing adequate clearance for bicycles and their riders. Directional signage shall be installed when bike parking facilities are not clearly visible from the street or sidewalk. When any covered automobile parking is provided, all required long-term bicycle parking shall be covered. When located off-street, bicycle and automobile parking areas must be separated by a barrier or painted lines.
3. Long-term parking for bicycles shall be for bicycles parked four (4) hours or more. Short-term parking for bicycles shall be for bicycles parked less than four (4) hours.
4. Bicycle parking required for residential uses must be located on-site.
5. Bicycle parking facilities shared by more than one use are encouraged.
6. Bicycle parking facilities required for nonresidential uses shall be located on the lot or in a shared bicycle parking facility within one hundred (100) feet of the lot, except as provided in subsection 7 below.
7. Bicycle parking may be located in a facility within one hundred (100) feet of the lot that is not a shared bicycle parking facility, or the applicant may make a payment to the City to fund public bicycle parking in lieu of providing required on-site bicycle parking, if the Director determines that:

- a. Safe, accessible and convenient bicycle parking accessory to a nonresidential use cannot be provided on-site or in a shared bicycle parking facility within one- hundred (100) feet of the lot, without extraordinary physical or financial difficulty;
- b. The payment is comparable to the cost of providing the equivalent bicycle parking on-site, and takes into consideration the cost of materials, equipment and labor for installation;
- c. The bicycle parking funded by the payment is located within sufficient proximity to serve the bicycle parking demand generated by the project; and
- d. Construction of the bicycle parking funded by the payment is assured before issuance of a certificate of occupancy for the development.

Chart E * for Section 23.54.015 PARKING FOR BICYCLES			
		Bike Parking Requirements	
Use		Long-term	Short-term
<u>Commercial Uses</u>			
<u>I.</u>	<u>General sales and services</u>	<u>1 per 12,000 sq ft</u>	<u>1 per 4,000 sq ft;</u> <u>1 per 2,000 sq ft in</u> <u>UC/SAO¹</u>
<u>II.</u>	<u>Heavy sales and services</u>	<u>1 per 4,000 sq ft</u>	<u>1 per 40,000 sq ft.</u>
<u>III.</u>	<u>Eating and drinking</u> <u>establishments</u>	<u>1 per 12,000 sq ft</u>	<u>1 per 4,000 sq ft;</u> <u>1 per 2,000 sq ft in</u> <u>UC/SAO</u>
<u>IV.</u>	<u>Lodging</u>	<u>1 per 20 rentable rooms</u>	<u>2</u>
<u>V.</u>	<u>Entertainment</u>	<u>1 per 12,000 sq ft</u>	<u>1 per 40 seats and 1 per</u> <u>1000 sq ft of non-seat</u> <u>area;</u> <u>1 per 20 seats and 1 per</u> <u>1,000 sq ft of non-seat</u> <u>area in UC/SAO</u>
<u>VI.</u>	<u>Medical services</u>	<u>1 per 12,000 sq ft</u>	<u>1 per 4,000 sq ft;</u> <u>1 per 2,000 sq ft in</u> <u>UC/SAO</u>
<u>VII.</u>	<u>Offices and Research and</u> <u>Development Laboratories</u>	<u>1 per 4,000 sq ft;</u> <u>1 per 2,000 sq ft in UC/SAO</u>	<u>1 per 40,000 sq ft.</u>
<u>Transportation Facilities</u>			
<u>VII.</u>	<u>Rail transit facilities and</u> <u>Passenger terminals</u>	<u>At least 20²</u>	<u>None</u>
<u>IX.</u>	<u>Principal use parking</u> <u>except Park and ride lots</u>	<u>1 per 20 auto spaces</u>	<u>None</u>
<u>X.</u>	<u>Park and ride lots</u>	<u>At least 20²</u>	<u>None</u>
<u>Manufacturing</u>			
<u>XI.</u>	<u>Manufacturing</u>	<u>1 per 4,000 sq ft</u>	<u>None</u>

*After the first 50 spaces for bicycles are provided for a use, additional spaces are required at one-half the chart ratio values.

Chart E
for Section 23.54.015
PARKING FOR BICYCLES

Use		Bike Parking Requirements	
		Long-term	Short-term
<u>Institutions</u>			
<u>XII.</u>	<u>Institutions not listed below</u>	1 per 4,000 sq ft; 1 per 2,000 sq ft in UC/SAO	1 per 40,000 sq ft.
<u>XIII.</u>	<u>Child care centers</u>	1 per 4,000 sq ft	1 per 40,000 sq ft.
<u>XIV.</u>	<u>Museums</u>	1 per 4,000 sq ft	1 per 4,000 sq ft
<u>XV.</u>	<u>Community clubs or centers</u>	1 per 4,000 sq ft	1 per 4,000 sq ft
<u>XVI.</u>	<u>Religious facilities</u>	1 per 12,000 sq ft	1 per 40 seats or 1 per 1000 sq ft of non-seat area
<u>XVII.</u>	<u>Libraries</u>	1 per 4,000 sq ft	1 per 4,000 sq ft; 1 per 2,000 sq ft in UC/SAO
<u>XVIII.</u>	<u>Hospitals</u>	1 per 4,000 sq ft; 1 per 2,000 sq ft in UC/SAO	1 per 40,000 sq ft.
<u>XIX.</u>	<u>Colleges</u>	A number of spaces equal to ten (10) percent of the maximum students present at peak hour plus five (5) percent of employees.	None
<u>XX.</u>	<u>Vocational or fine arts schools</u>	A number of spaces equal to ten (10) percent of the maximum students present at peak hour plus five (5) percent of employees.	None
<u>XXI.</u>	<u>Elementary schools</u>	1 per classroom	None
<u>XXII.</u>	<u>Secondary (Middle and High) schools</u>	2 per classroom	None
<u>Residential Uses</u>			
<u>XXIII.</u>	<u>Multi-family structures</u>	1 per 4 units	None
<u>XXIV.</u>	<u>Congregate residences</u>	1 per 20 residents	None
<p>1. For the purposes of this chart, UC/SAO means Urban Centers or the Station Area Overlay District.</p> <p>2. The Director in consultation with the Director of Transportation may require more bicycle parking spaces based on the following factors: Area topography; pattern and volume of expected bicycle users; nearby residential and employment density; proximity to Urban Trails system and other existing and planned bicycle facilities; projected transit ridership and expected access to transit by bicycle; and, other relevant transportation and land use information.</p>			

APPENDIX L: PARTNERS FOR BICYCLE PROGRAMS

The City recognizes that education, enforcement and encouragement programs are essential activities in order to achieve the goals of this Plan. This appendix lists a sample of groups that either already have a role in providing bicycle programs for Seattle residents, or could make good partners for the City in the future.

Bike Works

Bike Works, located in the Rainier Valley area of Seattle, offers an Earn-A-Bike program that teaches students age 9 to 17 about bicycle repair. After completing eight class sessions, students are allowed to earn their own recycled bicycle (along with a new helmet and lock) by completing 24 hours of repairing community bicycles ("Earn-A-Bike time") outside of class. Adult mentors provide guidance, friendship, and assistance with repairs. Bike Works also offers several other programs, including:

- Bicycle rodeos
- Summer bicycle camps
- Neighborhood rides
- Bicycle passports (youth log the number of miles that they bicycle and win prize incentives)

The Bicycle Alliance of Washington

The Bicycle Alliance of Washington advocates for bicyclists and bicycle-friendly cities, counties and state through legislation, policies and programming. The Alliance educates elected officials and decision makers about the importance of funding for safe bicycling routes and share the road legislation. Its programs include:

- Bike Buddy one on one mentoring for new bike commuters
- Bicycle programs in partnership with KC/METRO Transit
- KC/METRO Transit "Lost Bikes" program--helps people find bicycles that have been left on buses
- Bicycle parking at park and ride lots
- Bicycle parking and bike repair at Bikestation® Seattle
- Safe Routes to School clearinghouse
- Washington Center for Safe Routes, in partnership with Feet First
- Bicycle maps and resources
- Technical resources for trail development and other projects
- Commuter classes including gear and bike purchase advice
- "Get-Lit Washington" program—provides lights on bikes for low-income residents
- Information on the organization website

Cascade Bicycle Club

The Cascade Bicycle Club provides several education and encouragement programs to the local bicycling community. These programs include educating elected officials and agencies about building bicycle-friendly communities; teaching safe cycling to kids and adults; promoting bicycle commuting through individual and corporate programs; reviewing transportation plans; and working with schools on fitness programs and Safe Routes to Schools. The Cascade Bicycle Club Education Foundation offers programs and materials that are free or low-cost. Specific education, enforcement, and encouragement programs offered by Cascade Bicycle Club include:

- Bicycle commuter information

- Bicycle commuting classes
- Bicycle maintenance classes
- Ride SMART Bicycle riding skills classes
- Employer bicycle resources
- Commuter Challenge
- Bicycle to Work Day
- Bicycle rodeos
- Bicycle education for kids
- Bicycle safety program materials
- Bicycle camps
- Bicycle map distribution
- Helmet donations
- Helmet sales
- Bike to work month
- Safe Routes to Schools
- School fitness programs
- Club rides
- Information on the organization website

Feet First

Bicycle organizations, schools, and other groups should work with pedestrian groups, such as Feet First to develop and promote coordinated bicycle and pedestrian safety education programs. Feet First already provides several types of programs, including:

- Safe Routes to Schools Clearinghouse
- Pedestrian education (bicycling education should be coordinated with existing programs)
- Walking school buses (bicycling school buses should also be promoted)
- Technical assistance

Seattle Public Schools

With the exception of Safe Routes to Schools programs at specific schools, Seattle Public Schools does not currently use a comprehensive bicycle and pedestrian safety education curriculum. There may be opportunities in the future to work with Seattle Public Schools to implement a bicycle and pedestrian safety education program for students, with a particular focus on the elementary and middle school years. Seattle private schools could also be encouraged to offer this program. This program would include both in-classroom lessons as well as hands-on bicycle and pedestrian skills training. Lesson handbooks, teachers' guidebooks, videos, handouts, and other resources for these programs have been developed in other communities throughout the United States. Safe Routes to Schools Program funding may present an opportunity to develop and implement a comprehensive pedestrian bicycle safety education program in all local schools.

Seattle Police Department

The City of Seattle Police Department (SPD) should continue to enforce bicycle-related traffic laws. Enforcing these laws will help improve the behavior of both motorists and bicyclists, and increase the safety of bicyclists. The SDOT Bicycle Program Website provides a summary of regulations for bicycling and driving with bicyclists (see <http://www.seattle.gov/Transportation/bikecode.htm>). SPD should also issue a report with the number of warnings and infractions given to bicyclists and motorists annually.

Seattle Parks and Recreation Department

The Seattle Department of Parks and Recreation encourages bicycling by offering Group Health Bicycle Saturdays and Sundays. The Department closes Lake Washington Boulevard between Mount Baker Beach and Seward Park between 10 a.m. and 6 p.m. to provide bicyclists with a car-free experience on ten days during the year (see <http://www.cityofseattle.net/parks/athletics/bikesatsun.htm>).

Puget Sound Regional Council

The Puget Sound Regional Council (PSRC) recommends specific actions to promote bicycling in its *Regional Bicycle and Pedestrian Implementation Strategy for the Central Puget Sound Region* (2003). Agencies and organizations with a role in implementing the strategy are also identified. Actions include:

- Increase the use of print and broadcast media to educate the public about the positive economic, transportation system performance, social, health, and environmental impacts of bicycling and walking
- Integrate bicycle and pedestrian safety laws and regulations into driver's education classes and driver's license testing
- Produce materials on basic pedestrian and bicyclist safety laws and distribute in a wide variety of venues
- Develop and administer sustainable programs for bike riders of all ages to teach bicycle safety and hazard identification skills, build overall confidence, and teach cyclists how to effectively travel both on shared roadways and separated trails
- Develop and implement "Safe Routes to School" programs to improve community opportunities to safely walk to schools
- Produce, regularly update, and distribute maps of bicycle and pedestrian routes
- Consistently enforce bicycle and pedestrian safety laws among motorists, bicyclists and pedestrians

The City of Seattle supports these actions and encourages PSRC and other regional partners to assist with their implementation.

Other organizations that have played important roles in bicycle education, enforcement, and encouragement programs in Seattle include the King County Public Health Department, Washington State Department of Transportation, and Washington State Traffic and Safety Commission. These organizations are encouraged to expand on their current efforts in partnership with the City in the future.

APPENDIX M. KEY COMPONENTS OF BICYCLE EDUCATION PROGRAMS

Topics that should be covered in bicycle safety education programs include:

- Wear a helmet
- Obey stop signs and traffic signals
- Ride in the same direction as adjacent motor vehicle traffic
- Be as visible as possible and understanding the heightened risks of bicycling at night
- Ride on roadways versus riding on sidewalks
- Ride away from parked cars (and their driver-side doors)
- Avoid pulling out from behind turning automobiles at an intersection (particularly important when bicyclists are behind large vehicles, because it is extremely difficult for motorists from the opposing direction to see approaching bicyclists)
- Ride safely near large trucks, including understanding safety issues related to right-turns. To make right-turn movements, trucks often move left, opening up space along the curb to their right. It is important not to enter this space, because the truck will swing right again to make the turn. Visibility on the right side of a truck also tends to be more difficult for truck drivers.

[CALL-OUT BOX: Head injuries cause about three-fourths of the 800 to 900 deaths resulting from bicycling-related accidents in the U.S. each year. According to a study conducted by the Harborview Injury Prevention and Research Center, helmets that meet ANSI or Snell standards can cut the risk of riders' head injuries by 85%.](#)

Disobeying traffic controls is one of the most common causes of bicycle crashes in the City of Seattle. Bicyclists who do not stop at traffic signals or stop signs create a risk for themselves, pedestrians, motor vehicle drivers, and other users of the transportation system. Bicyclists who disregard traffic control may create public animosity towards all bicyclists, even if the majority of bicyclists follow the rules of the road.

Riding against traffic, either on the sidewalk or on the roadway, increases the risk of being involved in crashes at driveways or intersections because drivers turning right from intersecting streets typically only look left before they turn and do not see bicyclists approaching from the opposite direction.

Adult bicyclists are encouraged to ride on roadways rather than on sidewalks in Seattle. The roadway is typically the safest location for most bicyclists to ride if they typically ride faster than a typical jogger (e.g., 5 to 10 miles per hour). Most sidewalks have a design speed of 5 to 10 miles per hour, so bicyclists they should be able to ride safely on sidewalks at those speeds. However, most bicyclists typically travel faster than 10 miles per hour. Bicyclists on sidewalks do not approach intersections from the same areas as motor vehicle traffic, so they can be difficult for drivers to see, particularly when they are traveling at high speeds. Further, bicycling on sidewalks can cause conflicts with pedestrians, particularly in busy commercial areas.

There are a few situations where it may be useful for bicyclists to ride on the sidewalk. In these cases, bicyclists should ride in the same direction as vehicles in the adjacent roadway lanes, whenever possible.

- Bicyclists are traveling slowly (similar speed to a slow jogger, or 5 to 10 miles per hour)—this includes child bicyclists

- Bridges without on-road bicycle facilities
- Locations where a bicyclist would need to cross a multi-lane roadway to ride in the same direction as traffic for a short distance (the crossing may be impractical and potentially less safe than riding in the opposite direction as traffic on the sidewalk)
- Short sections of one-way streets, especially where steep hills (downtown) make going around the block very impractical.

It is imperative that bicyclists who chose to ride on the sidewalk in either direction be educated about the hazards associated with this practice. Bicyclists must always yield to pedestrians on sidewalks.

When riding at night, bicyclists must ride with front and rear lights to increase their visibility to drivers. Additionally, bicyclists should be encouraged to wear appropriate color clothing and other reflective materials to be even more visible.

While these critical safety issues are important for bicyclists to be aware of, drivers must also be targeted with these educational messages to increase their awareness of bicycle crash risks. Motorists should be instructed to look in both directions for bicyclists when turning at intersections, drive more slowly, and be aware the potential for bicyclists to be riding at night.

CALL-OUT BOX: Rules of the Road

For bicyclists:

- Follow the same laws that apply to motorists. Obey all traffic signals, signs, and lane markings. Always yield to pedestrians.
- Ride on the right side of the road with the flow of traffic—never against it
- Always wear a properly fitting helmet.
- Ride predictably and defensively. Use hand signals before turning.
- Be visible. If riding at night, use lights, reflectors, and bright clothing.
- Avoid riding on sidewalks, if possible. If it is necessary to ride on a sidewalk, keep speeds close to a typical jogging speed. Be aware of risks at intersections and always yield to pedestrians.

For motorists:

- Obey speed limits. Higher speeds result in greater injuries to cyclists and pedestrians.
- Obey signs, signals, and markings. Never run red lights.
- Always look for bicyclists when turning left or right.
- Pass bicyclists with care. Slow down and provide enough space when passing.
- Do not use your horn in close proximity to bicyclists.
- Look for bicyclists when opening doors.
- Watch for children.
- Watch for bicyclists riding at night.

Safety messages should be targeted to both drivers and bicyclists. Information about bicycle safety should be shared in the following ways:

- Seattle Bicycling Guide Map
- Web sites
- Signs on buses and bus shelters
- Brochures available at parks, transit stations, stores, schools, etc.
- Public Service Announcements on radio and television

- Roadside variable message signs
- Share the Road with Bicycles bumper stickers and license plates

APPENDIX N. INTEGRATION OF BICYCLE RECOMMENDATIONS INTO OTHER TRANSPORTATION PLANS AND GUIDELINES

Institutionalizing the Bicycle Master Plan requires integrating a number of its components into the policies and procedures of the City. Including the needs of bicyclists in documents such as the Transportation Strategic Plan, Right-of-Way Improvements Manual, Standard Specifications, City ordinances, design guidelines, and other written policies will increase the prominence of bicycle transportation improvements in the City’s day-to-day business.

Recommendations for integrating specific elements of this Plan into specific City policy documents are provided in the following table.

Table L.1. Specific Bicycle Master Plan Elements to Incorporate into City Policy Documents

Policy Document	Plan Element
Seattle Municipal Code; Land Use Code Ordinance	Recommended changes to existing bicycle parking requirements; Other land use code changes
City of Seattle Comprehensive Plan	Urban Trails and Bikeways System Map
Transportation Strategic Plan	Goals
	Objectives
	Performance Measures
	Bicycle Facility Network Map
	Arterial Streets with Recommended Bicycle Facilities Map
	Urban Trails and Bikeways System Map
	Signed Bicycle Route System Map
	Roadway Crossing Improvements Map
	Key Locations for Coordinating Bicycle Facility Design with Future Rapid Transit Service Map
	Revised bicycle classifications based on Bicycle Facility Network systems (Arterial Streets with Bicycle Facilities, Urban Trails and Bikeways System, and Signed Bicycle Routes)
SDOT Annual Report	Performance reporting (both “By the Numbers” and outcome measure reporting)
Right-of-Way Improvements Manual	Guidance for Retrofitting Seattle Streets to Create Dedicated Bicycle Facilities (Appendix F)
	Signage/Wayfinding Protocol (Appendix G)
	Bicycle Facility Design Guidance for Signed Bicycle Route Arterial Roadway Crossings (Appendix H)
	Geometric changes to improve arterial roadway crossings for bicycles (Appendix H)
Standard Specifications	Bicycle Facility Design Guidance for Bicycle Lanes, Climbing Lanes, Shared Lane Pavement Markings (Appendix E)
	Traffic Control and Right-of-Way Assignment for Multi-Purpose Trail Crossings (Appendix H)
	Pedestrian crossing signal upgrade policy to facilitate bicycle crossings (Appendix H)

	Bicycle wayfinding sign specifications (SP 600 series)
Complete Streets Checklist	Add reference to the bike facility network map and the Cross Section Map for bicycle facility development (opportunities for bicycle lanes, climbing lanes, and shared lane pavement markings) (Appendix F)
	Capital projects for bicycle improvements (e.g., roadway or bridge construction/reconstruction)
Pavement Opening and Restoration Rules	Maintenance Activities Table?
Annual Resurfacing Program	Cross Section Map for bicycle facility development (opportunities for bicycle lanes, climbing lanes, and shared lane pavement markings) (Appendix F)
Sign Management Program	All types, text, and locations of bicycle wayfinding signs (for Hansen GIS coding)
SDOT Bicycle Spot Improvement Program	Recommendations for spot maintenance and operational improvements
SDOT Signal Improvements List (Internal)	Traffic signal recommendations to facilitate safer bicycle crossings
To Be Determined	Maintenance Activities Table
Bicycle Facility Maintenance Policy Agreement with Seattle Department of Parks and Recreation	Renegotiate Agreement
Bicycle Facility Maintenance Policy Agreement with Seattle City Light	Negotiate an Agreement
Seattle Bicycling Guide Map	Specific Recommendations Categories from the Bicycle Facility Recommendations Map
SDOT Website	Online Bicycle Route Wayfinding Program
SDOT Commute Trip Reduction Program	Recommendations to encourage employers to offer incentives for employees who bicycle

APPENDIX O: COST ESTIMATES

General (order of magnitude) cost estimates were developed for the main components of this Plan. The estimated cost to implement this Plan over 10 years is approximately \$240 million (based on 2007 dollars). The Plan cost includes approximately \$35.7 million for on-road bicycle facilities, \$7.0 million for roadway crossing improvements, \$63.7 million for multi-use trail facilities (includes the Burke-Gilman Trail missing link), \$80.6 million for major capital projects (e.g., bicycle and pedestrian bridges), \$46.5 million for bicycle facility maintenance, and \$5.9 million for other projects (e.g., bicycle parking, bicycle maps, bicycle education, etc.). The level of investment that will be required in order to implement this Plan is relatively modest in comparison to other transportation facilities.

The general costs were developed by calculating rough quantities and applying unit costs (based on 2006 City of Seattle cost data). Costs were then translated into per mile or per facility costs, as explained in the spreadsheet associated with this appendix. For bicycle facilities that may be implemented with a larger project, the estimate represents the marginal cost required to develop the bicycle facility. For example, if bicycle lanes are added to a roadway during a repaving project, the estimate includes just the cost to implement the bicycle lanes (e.g., new pavement markings and bicycle related signs), but it does not include the new pavement.

Estimation of the costs involved several assumptions, including:

- Cost estimates assume that most on-road bicycle facilities will be added as a component of an overall project to improve the roadway for all types of users; few roadway projects will be done for the exclusive purpose of adding bicycle facilities.
- Costs are based on 2007 dollars. They may change due to future economic conditions.
- Costs assume that facility projects will be implemented by contractors through a bidding process. They may vary if projects are done in-house.
- Facility costs include construction and design.
- All construction projects include a contingency, typically estimated at 25 percent of the construction cost.
- Design and construction costs may vary depending on the actual construction project size (e.g., project limits) and overall cost. Implementation will likely be more costly if bicycle improvements are done as many small projects compared to a smaller number of large projects.
- During the early design stages of projects, maintenance of traffic, mobilization, potential utility impacts, drainage, and property acquisition costs can be based on a percentage of total project cost. These costs are not included in the estimates because specific projects are not yet defined and those project limits are unknown.
- Costs for adding new pavement to create on-road bicycle facilities do not include curb and gutter, drainage, erosion and sediment control, and grading. These costs are not included in the estimates because specific projects are not yet defined and those project limits are unknown.
- Costs for right-of-way acquisition are not included. These costs are not included in the estimates because specific projects are not yet defined.
- Costs for new multi-use trail construction include pavement, drainage, erosion and sediment control, and grading, but not right-of-way acquisition.

- Regulatory and warning signs for bicycle lanes and on-street parking are included in the on-road bicycle facility costs. Bicycle wayfinding signs are also included in the on-road bicycle facilities category.
- Costs are classified as construction costs only when new facilities are developed. Costs for restriping roadways, repaving trails, replacing signs, and other similar activities are considered to be maintenance costs.
- Cost calculations assume that bicycle facility improvements are made on both sides of the street. Costs are generally over-estimated for the small portion of recommendations on one-way streets.